JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XXVIII FEBRUARY, 1939 No. 2

ANDREW GROVER DUMEZ.

The President-Elect of the ASSOCIATION was born in Horicon, Wis., April 26, 1885, the son of Andrew Alexander and Anna Meister DuMez, both parents being natives of Milwaukee. The father was a pharmacist and the son obtained his practical training and his interest in Pharmacy from his father. Young DuMez' general education was obtained in the Graded Schools of Cashton, Wis., from 1891 to 1897; and in the High Schools of that city from 1897 to 1900. He entered the University of Wisconsin in the fall of 1902 and was awarded the following degrees by that institution: Graduate in Pharmacy (Ph.G.), 1904; Bachelor of Science (B.S.), 1907; Master of Science (M.S.), 1910; and Doctor of Philosophy (Ph.D.), 1917.

Pharmaceutical education and research have received a major portion of Dr. DuMez' attention as the following record will indicate:

Instructor in Pharmaceutical Chemistry, University of Wisconsin, Madison, Wis., 1905–1910; Professor of Chemistry, Pacific University, Forest Grove, Oregon, 1910–1911; Assistant Professor of Chemistry, Oklahoma Agricultural and Mechanical College, Stillwater, Okla., 1911–1912; Director of the School of Pharmacy of the University of the Philippines, Manila, P. I., 1912–1916; Hollister Fellow, University of Wisconsin, 1916–1917; Associate Pharmacologist, Hygienic Laboratory, U. S. Public Health Service, Washington, D. C., 1917–1926; Dean of the School of Pharmacy, University of Maryland, Baltimore, Md., 1926 to date.

In addition to other research activities, Dr. DuMez was the first to propose and suggest bismuthous iodide as a remedy for amœbic dysentery. This work was published in 1916 and the publications that have followed include:

"The Galenical Oleoresins," bulletin of the University of Wisconsin, 1917, page 288; "Digest of Comments on the Pharmacopœia of the United States and the National Formulary," bulletin of the Hygienic Laboratory, U. S. Public Health Service, published annually, 1916–1922. Editor of the "YEAR BOOK OF THE AMERICAN PHARMACEUTICAL ASSOCIATION," 1921–1935. Editor of "Pharmaceutical Abstracts," 1935 to date. Co-author with Glenn L. Jenkins, of "Quanti-

tative Pharmaceutical Chemistry," McGraw-Hill Book Co., 1930; and numerous scientific articles published in *U. S. Public Health Reports, Philippine Journal of Science, Journal American Medical Association, American Journal of Pharmacy,* JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, *Journal of Chemical Education,* etc.

Dr. DuMez has taken an active part in pharmaceutical efforts of various kinds and in this connection has held a number of important appointments and offices, among them:

1914, Member of a committee to revise the pharmacy and drug laws of the Philippine Islands, appointed by the Director of Health; 1915, appointed by the Vice-Governor to investigate the schools and colleges of pharmacy in the Philippine Islands; 1918–1919, served as a member and secretary of the Special Committee to investigate the Traffic in Narcotics in the United States, appointed by the Secretary of the Treasury; 1920, elected a member of the Revision Committee of Pharmacopœia of the United States, and Chairman of the Sub-Committee on Nomenclature to serve for ten years; reëlected in 1930 and made vice-chairman of the Committee, also reëlected chairman of the Sub-Committee on Nomenclature; 1925, official delegate of the United States Government of the Second Conference on the Unification of Standards for Potent Remedies held in Brussels, Belgium, September 21–27, 1925, appointed by the Secretary of State with the approval of the President; 1932, secretary-treasurer, American Council on Pharmaceutical Education.

The memberships held by Dr. DuMez in professional associations, clubs and lodges and the offices held in these organizations, include:

Wisconsin Academy of Science, Arts and Letters; AMERICAN PHARMACEUTICAL ASSOCIATION, (President-Elect 1939; Chairman, Scientific Section 1920–1921; Member of the Council, 1920 to date; Secretary of the Council, 1920–1923); American Chemical Society; American Association of Colleges of Pharmacy (President, 1928–1929); American Public Health Association; American Association for the Advancement of Science (Fellow); Maryland Pharmaceutical Association; Sigma XI, Rho Chi, Phi Delta Chi, Kappa Psi, etc.; Kiwanis Club of Baltimore; Masonic, Temple Noyes Lodge No. 32, Washington, D. C.

The President-Elect has been a prominent figure in Pharmacy for several years and has made valuable contributions toward its progress. He is well acquainted with the work of the A. PH. A., with its objectives and with its needs. He will bring to the office the thorough training, broad contacts and wide experience on which a constructive administration of the offices of the ASSOCIATION can be based.

Dr. DuMez and Miss Mary Elizabeth Fields were married in Olney, Illinois, June 9, 1912, and make their home in the Garden Apartments, Baltimore, Maryland.

EDITORIAL

E. G. EBERLE, EDITOR EMERITUS. 2215 Constitution Ave., WASHINGTON, D. C.

U. S. CIVIL SERVICE EXAMINATION FOR JUNIOR PROFESSIONAL ASSISTANT.

The Civil Service Commission has recently announced an open competitive examination, No. 18 (Assembled), for Junior Professional Assistant in twenty-two optional branches, one of which is Junior Pharmacist. This is the first grade in the professional and scientific classification and the beginning salary is $2000 a year subject to a deduction of $3\frac{1}{2}$ per cent toward a retirement annuity.

The examination is not being given to fill any particular position or positions but rather to establish a list of eligibles which list may be certified separately in accordance with civil service rules to fill vacancies occurring in the positions for which the examination is given and in positions requiring similar qualifications. This will be the first general list of eligible pharmacists to be established in the professional and scientific classification of the civil service.

Applicants must be citizens of the United States, must not have passed their thirty-fifth birthday on the date of examination, must be in sound physical health and must have successfully completed a full four-year course leading to a bachelor's degree in a college or university of recognized standing.—E. F. K.

PHARMACY UNDER HEALTH INSURANCE IN GREAT BRITAIN.

The nineteenth annual report of the British Ministry of Health for 1937–1938 (year ending March 31, 1938) contains some very interesting information about the participation of pharmacists (chemists) in the National Health Insurance.

The insured persons numbered approximately 16,138,000; the physicians under contract numbered approximately 16,000 or about 1 per 1000 insured persons and the chemists shops (pharmacies) under contract numbered approximately 12,000 or about 1 per 1,345 insured persons.

Of the total expenditure for medical benefits, insurance doctors received £7,200,000 ($33,840,000), insurance chemists received £2,195,700 ($10,319,700), insurance doctors received for medicines and appliances dispensed by them £192,000 ($902,400), and the remainder was for special services.

During the year 65,792 prescriptions were filled or 4.75 per person.

"A review of the disciplinary proceedings which have been found necessary during the year, particulars of which are given below, afford no ground for thinking that there has been any deterioration in the high standard of service reached by insurance doctors and chemists."

"The number of cases in which money was withheld from insurance chemists on account of breaches of their terms of service and the total amount withheld were 161 and £203 5s 6d . . . . . Under the scheme for testing drugs and appliances 4,589 samples were tested and inaccuracies considered to warrant the withholding of money for breaches of the terms of service were found in 158 cases." The percentage of tested dressings found deficient in quantity decreased for 1.8% in the preceding year to 1.3% while the percentage found deficient in quality increased from 6.2% to 7.9%. The large majority were cases of substantial inaccuracies in the dispensing of test prescriptions.—E. F. K.

SECTIONS

BOARD OF REVIEW OF PAPERS (SCIENTIFIC SECTION).—*Chairman*, F. E. Bibbins; H. M. Burlage, W. G. Crockett, E. V. Lynn, C. O. Lee, L. W. Rising, L. W. Rowe, Heber W. Youngken, Ralph E. Terry, Carl J. Klemme.

TOXICITY AND ANTIPYRETIC PROPERTIES OF SOME HALOGENATED ACETANILIDS.*

MELVIN F. W. DUNKER[1] AND MARVIN R. THOMPSON.[2]

Investigations of the past few years have begun to direct attention to further study of compounds of fluorine both chemically and physiologically. Inorganic fluorides both soluble and insoluble have, in spite of their high toxicity, been also investigated physiologically; thus, a 1 per cent solution of sodium fluoride has been tried in certain parathyroid conditions (1) and intravenous injections of calcium fluoride have been tried for decreasing the phosphorous in the urine (2).

G. Litzka (3) has studied the toxicity and antithyroideal activity of 3-fluorotyrosine in a series of papers. Henne (4), working with fluorinated hydrocarbons to be used as refrigerants, has shown that as the hydrogens of methane are successively replaced by fluorine beyond the introduction of the first fluorine atom, the stability of the compound increases and the toxicity decreases. Animals were able to exist in an artificial atmosphere of 80 per cent fluoroform and 20 per cent oxygen.

Vliet and Volweiler (5) have prepared some mercurated benzotrifluorides which are relatively non-toxic and are claimed to have antiseptic activity.

Lehmann (6) studied the effect of the introduction of fluorine into the side chain of five aromatic compounds and compared their activities with those of the parent hydrocarbons and with the analogous chloro-compounds. He found that the introduction of fluorine and chlorine in the side chain of tolulene and *m*-toluidine increased the toxicity of the compound over that of toluene, the fluorine more so than the chlorine. *m*-Trifluorotoluidine could be used as a narcotic for frogs.

The action of fluorobenzene, *p*-fluorotoluene and *p*-fluoroacetanilid was studied by K. Lang (7). He found that the fluorine was apparently not stored in the tissues of the body with the possible exception of some accumulation in the heart. The pharmacological action of the substances gave no evidence of a specific effect of fluorine, the compounds resembling in activity the corresponding non-halogenated compounds. The fate of fluorobenzene and *p*-fluoroacetanilid in the body could not be determined with certainty, the fluorine appearing in unidentified organic compounds, but *p*-fluorotoluene was found in the urine as *p*-fluorobenzoic acid.

Recently there has appeared an investigation of some pressor compounds containing fluorine. H. L. Hansen (8) reported the preparation of several chloro- and fluoro-adrenalones and found that, while both types of halogenated derivatives were far inferior to the parent substance, the fluoro-derivatives were less active than the corresponding chloro-derivatives. He made no statement of the relative toxicities of the compounds.

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* Presented before the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

[1] School of Pharmacy, University of Maryland, Baltimore, Md.

[2] Warner Institute for Therapeutic Research, New York City.

In the present investigation, the antipyretic properties of *m*- and *p*-fluoroacetanilid and *p*-chloroacetanilid and the relative toxicities of acetanilid and *p*-fluoroacetanilid were studied. A review of the literature showed that the laboratory tests on the toxicity of acetanilid have been carried out using most of the common laboratory animals and the tests of antipyretic activity have been carried out on rabbits and white rats. The present writers have used cats ranging from 2.0 to 2.5 Kg. for the toxicity studies and from 1.5 to 3.0 Kg. for the tests of antipyretic activity.

The *m*- and *p*-fluoroacetanilids were prepared by the method of Schiemann and Pillarsky (9) and the *p*-chloroacetanilid from *p*-chloroaniline and acetic anhydride. All of the compounds were recrystallized and melted at the temperatures reported in the literature.

It was thought desirable to note whether or not there would be any effect on circulation and respiration when the fluoroacetanilid was given intravenously. For this purpose, the carotid blood pressure and respiration (by tracheal canula) were simultaneously recorded in the usual manner during the perfusion of solutions of either acetanilid or *p*-fluoroacetanilid (0.5 Gm. per 100 cc.) in 10 per cent alcohol into the femoral vein. It was necessary to use 10 per cent alcohol because of the low solubility of *p*-fluoroacetanilid in water.

It was found that after some solution had been run in, it was no longer necessary to administer ether. This was, presumably, the effect of the alcohol being given since the same was true for the control with 10 per cent alcohol alone. No very significant differences between the alcohol

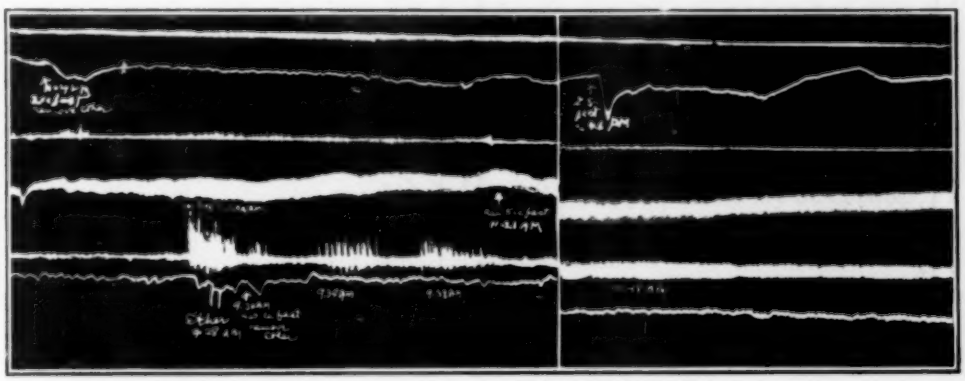

Fig. 1.—The upper tracing of each pair shows respiration, the lower shows carotid blood pressure (mercury manometer). The pairs reading from top to bottom are for *p*-fluoroacetanilid for 10 per cent alcohol alone and for acetanilid. Ether anesthesia. The first section was taken, 10 minutes after the beginning of the experiment and the second 65 minutes later.

and the alcoholic solutions of the acetanilids can be shown. However, after about 10 cc. of the 10 per cent alcohol had been run in, the pulse pressure of the cat had doubled and, after about 40 cc., had tripled the original value, while when either the solution of acetanilid or *p*-fluoroacetanilid was injected the pulse pressure remained unchanged or increased by about one-half its original value until close to death. The rapid injection of 5 cc. of 10 per cent alcohol caused only a slight fall in blood pressure whereas 3 cc. of the solutions of acetanilid or *p*-fluoroacetanilid produced sharp transient falls in blood pressure. These facts are offered for comparison with the report of L. F. Herz (10) who stated that acetanilid when injected intravenously in 35 per cent alcohol produced a tracing identical with that given by 35 per cent alcohol alone. Obviously the effect of the 35 per cent alcohol was sufficient to obscure any effect the acetanilid may have had. The tracings would seem to indicate that both acetanilid and *p*-fluoroacetanilid partly prevented the increase in pulse pressure normally caused by the alcohol.

In the experiments on acute toxicity, cats of both sexes in the weight range 2.0 to 2.5 Kg. were used. The calculated dose was given by capsule and the time recorded. Based on a number of observations, *p*-fluoroacetanilid appeared to show toxic symptoms (stiffening of the hind legs, loss of sense of balance) more rapidly than did acetanilid. With both compounds the animals died of respiratory failure. The dose saffected liver function, the liver showing a peculiar mottling. In the advanced stages there was relaxation of the abdominal muscles and the animals lay

down breathing heavily. Near death, convulsions were sometimes observed. *p*-Fluoroacetanilid differentiated itself from acetanilid in that there was little or no dilatation of the pupil and little salivation. Both compounds produced cyanosis.

From the standpoint of the oral dose of acetanilid or *p*-fluoroacetanilid necessary to produce death, there is little from which to choose. Acetanilid regularly produced death (5 out of 5 cats) when given orally in capsules containing a dose of 0.25 Gm. per Kg. cat. At this same dose level, *p*-fluoroacetanilid caused death in 3 out of 6 cats while doses of 0.275 Gm. per Kg. were fatal in all cases. S. T. Helms (11) stated that he used all the usual laboratory animals and that doses of 1000 mg. acetanilid failed to produce death in any case.

To determine whether there was any difference in chronic toxicity, some cats were given daily doses of acetanilid and *p*-fluoroacetanilid by capsule. The daily administration of 0.03 Gm. per Kg. cat (one-eighth the dose of acetanilid found to be fatal) of acetanilid or *p*-fluoroacetanilid for 3 weeks produced very little noticeable effect. There was practically no loss in weight by either of the cats. The dose was doubled (one-fourth the fatal dose of acetanilid). After 5 more weeks neither cat showed very much change, a small weight loss having occurred, which, in the case of the cat receiving acetanilid, was slightly greater. The daily dose was raised to one-half

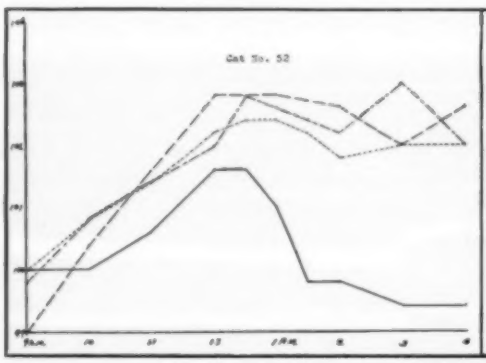

Fig. 2.

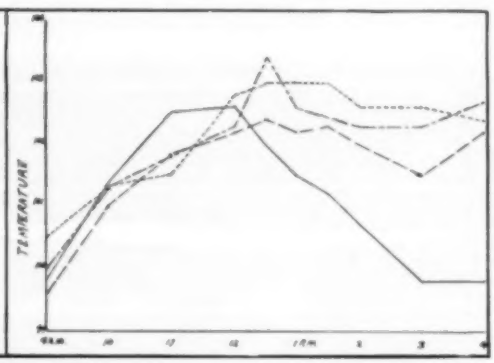

Fig. 3.

Fig. 2.—The course of the fever is shown by — — —, the effect of the dose of acetanilid by ———, the effect of the same dose of *p*-fluoroacetanilid . . . . . , and of double this dose by — . — . —.

Fig. 3.—The effect of the dose of acetanilid is shown by ———, the effect of the same dose of *p*-fluoroacetanilid by . . . . . , the effect of the same dose of *m*-fluoroacetanilid by — . — . —, and of *p*-chloroacetanilid by — — —.

the fatal dose of acetanilid when the decline in weight became more evident and the cats were definitely depressed at all times. Five days later the cat receiving the *p*-fluoroacetanilid died. The kidneys showed extensive hemorrhage, the liver the characteristic mottled appearance. The teeth showed no mottling. The cat receiving acetanilid lived for an additional 34 days. Its liver and kidneys showed similar effects. A pair of cats was started with a daily dose of either compound of one-half the fatal dose. The cat receiving *p*-fluoroacetanilid died after the second dose, the cat receiving acetanilid after the fifth dose. Another cat given the same daily dose of *p*-fluoroacetanilid died after the third dose.

The antipyretic activities of acetanilid and *p*-fluoroacetanilid were compared in the following manner. The cats were given an intraperitoneal injection of 10 cc. of a 5 per cent solution of dried egg albumin in normal saline solution at 9 A.M. The rectal temperature was taken before the injection and every hour until noon. At 12 noon a capsule containing the desired dose of acetanilid or *p*-fluoroacetanilid (0.025 Gm. per Kg. cat) was given orally. The rectal temperature was taken every half hour for 2 hours and then every hour for 2 hours. In all cases, the fall in temperature produced by acetanilid was quite marked while that by *p*-fluoroacetanilid was insignificant. To rule out any resistance of the cats to one or the other of the compounds, the doses of the drugs were reversed after a suitable rest period. Since the doses of *p*-fluoroacetanilid quite uniformly produced little or no fall in temperature, the dose in a series of trials was raised to 0.05 Gm. per

Kg. cat. This dose of *p*-fluoroacetanilid elicited light toxic symptoms in some of the cats but produced no greater fall in temperature than the original dose. Figure 2 shows the characteristic results obtained throughout.

In this connection it should be noted that it was often possible to use the same cat on successive days or sometimes on the second day after a previous use. However, if a week or more intervened between the trials on the cat, the results could not be relied upon. A reaction, apparently to the protein, made itself evident. To obviate this difficulty when the above procedure became impractical, the following modification was adopted. Five cats were injected with the 5 per cent solution of albumin and the temperatures recorded as before. At noon, capsules of *m*-fluoroacetanilid (0.025 Gm. per Kg.) were given to all cats. The average temperatures for the five cats were then plotted. The same procedure was also followed with *p*-chloroacetanilid. Figure 3 indicates the results obtained. For the purpose of comparison, the data obtained for acetanilid and *p*-fluoroacetanilid have been recalculated on the above basis and shown also.

DISCUSSION.

The slight difference in the acute toxicity of *p*-fluoroacetanilid as compared to acetanilid may be dependent on the lower degree of solubility of the former. The resulting slower absorption may also account for the more rapid death of cats receiving repeated large doses of *p*-fluoroacetanilid, the accumulation being greater. Apparently a certain degree of tolerance is established after repeated dosage as is evident from the fact that cats having received small doses of both compounds for a period withstood the dosage of 0.125 Gm. per Kg. for a longer time. Substitution of chlorine or fluorine in the nucleus very markedly reduces the antipyretic activity of acetanilid and, in the case of *p*-fluoroacetanilid, reduces the toxicity but little.

SUMMARY.

1. *p*-Fluoroacetanilid shows no greater acute toxicity for cats than does acetanilid.

2. *p*-or *m*-Fluoroacetanilid or *p*-chloroacetanilid show very little or no antipyretic activity.

(The authors acknowledge suggestions from Dr. E. B. Starkey.)

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THE ASSAY OF VERATRUM VIRIDE.*,[1,2]

BY B. V. CHRISTENSEN[3] AND A. P. MCLEAN.[4]

In a previous paper (1) the literature dealing with the attempts to standardize preparations of Veratrum viride by chemical and pharmacological methods was reviewed. A consistent emetic response of pigeons to small doses of Veratrum was reported, and the determination of the minimum pigeon emetic dose was suggested as a possible means of estimating the potency of preparations of this drug.

The present work was undertaken to determine the suitability, accuracy and reliability of the minimum pigeon emetic dose method for estimating the potency of Veratrum viride and to determine whether or not this method is more suitable than previously proposed assay methods.

I. PIGEON EMESIS.

The method has been previously described (1) as a modification of the method proposed by Hanzlik (2, 3) for estimating the potency of digitalis. The minimum pigeon emetic dose (M. Em. D.) for a preparation of Veratrum viride was considered as the smallest amount of the drug, expressed in cc. of the tincture per Kg. body weight, which would produce emesis in at least 75 per cent of a group of eight pigeons within fifteen minutes after the intravenous injection of the diluted tincture.

In this study thirty-three assays were carried out on twenty tinctures of Veratrum viride; an average of thirty-three pigeons per assay was used. The M. Em. D. of the tinctures ranged from 0.010 to 0.090 cc. per Kg., and the mean M. Em. D. for all assays was found to be 0.0395 cc. per Kg. Since these assays were performed in the usual manner, the detailed results will not be given; however, the following dose-response chart, based upon the data obtained from all of the emetic assays, is presented.

A record was kept of the individual responses of one hundred and fifty pigeons during the course of Veratrum assays over a period of three months. An analysis of this data indicates that, although there is some variability of response as one would expect with any physiological experiments, there is not sufficient difference in the response of pigeons to Veratrum to necessitate the "standardization" of the test animals. Furthermore, a comparison with the analyses made of other assay methods showed that pigeons gave a more uniform response to emetic doses of Veratrum than dogs, cats, rabbits, mice or frogs gave to lethal doses of this drug.

Since Lieb and Mulinos (4, 5) have reported that, upon continued use for emetic assays, pigeons became susceptible to the conditions of the experiment and that spontaneous emesis would result in a high per cent of animals when saline was injected, it was decided to investigate this possibility of error under the conditions of these experiments. From time to time during the regular assay work saline was injected instead of the drug. One hundred and twenty-four saline injections were made, and in only two cases did emesis occur. This difference in results is perhaps due to the fact that Lieb and Mulinos injected pigeons with a weekly emetic dose, while in the Veratrum assays reported above the pigeons were allowed a rest period of approximately two weeks between injections, and in routine assays many animals received injections of sub-emetic doses. These results indicate that the "conditioning" of pigeons to emesis is not a great source of error under the conditions observed in these assays.

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* Presented before the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

[1] Abstract of a thesis presented to the Graduate Council of the University of Florida in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

[2] Part of this work was carried on in the Department of Pharmacology, School of Medicine, University of Oklahoma, and was aided by a grant from the Research Fund of the University of Oklahoma School of Medicine.

[3] Director, School of Pharmacy, University of Florida.

[4] Instructor in Pharmacology, School of Medicine, University of Oklahoma.

Since the quantity of alcohol present in an emetic dose of the tincture was quite small (average about 0.009 cc. per animal), it would appear improbable that it would have any effect upon the emetic dose. The wide range in potency of the preparations assayed would appear to substantiate this belief; however, injections of 3 cc. of 20 per cent alcohol per Kg. were made in one hundred and seven pigeons and emesis resulted in only two cases. This is in agreement with results reported by Hanzlik (3) in connection with the pigeon assay of digitalis.

The possibility that pigeons might develop a tolerance for Veratrum or that they might become more susceptible after repeated injections was investigated. In 1937 several preparations were assayed using some pigeons for the first time and others that had been used repeatedly. No difference in response could be detected. In 1938 two tinctures were assayed on pigeons that had been used at intervals of fourteen days for three months; on the same day each preparation was assayed on birds that had not been previously used for Veratrum assays. The emetic dose of one tincture was the same with both groups; that of the second tincture was 0.005 cc. per Kg. larger

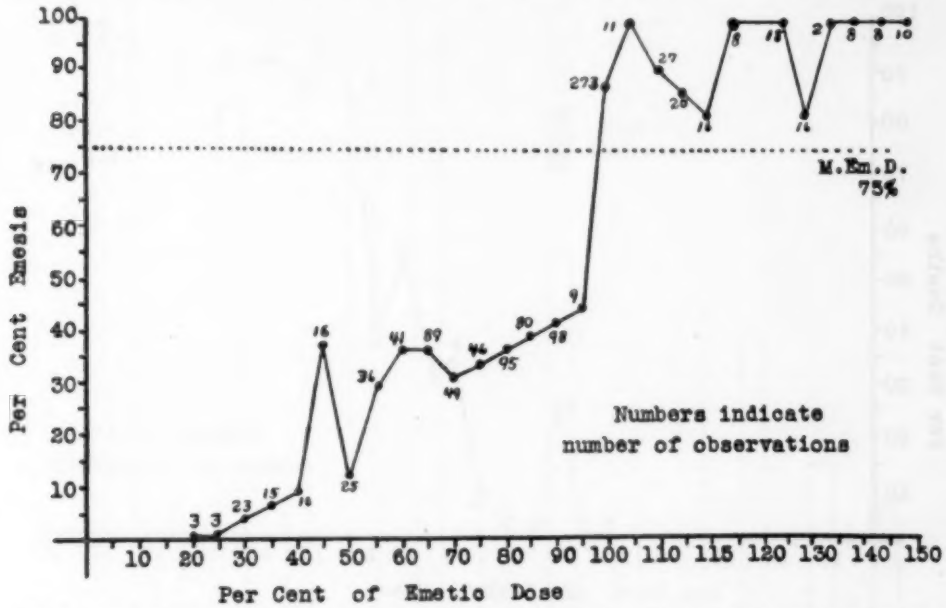

Fig. 1.—The response of pigeons to fractions of the M. Em. D. The per cent emesis represents the mean for all observations at a given dose fraction.

with the group of pigeons repeatedly used, but this difference was within the range of experimental error.

It was found that the emetic response of pigeons to Veratrum viride was quite sensitive and that differences of 10 per cent in dosage could be easily detected.

II. MINIMUM LETHAL DOSE METHODS.

Pigeons.—For the determination of the M. L. D. for pigeons, healthy adult pigeons weighing from two hundred and fifty to four hundred Gm., from which food had been withheld for from twelve to sixteen hours, were weighed to the nearest 5 Gm. and tied on a pigeon board (3). A single injection of the tincture, diluted one to three in physiological salt solution, was made into the brachial vein after which the birds were immediately removed from the board and placed in observation cages.

With a fatal dose death usually resulted within four minutes and in only three instances did death occur after fifteen minutes. In view of the rapid action of the drug, it was decided to exclude these delayed reactions and to set fifteen minutes as the maximum observation time. One hour after the injection of a sub-lethal dose pigeons were found to be markedly depressed, but in only one case did death occur after this time.

The M. L. D. for pigeons was considered as the smallest amount of the drug, expressed as cc. of tincture per Kg. body weight, which would produce death in at least 75 per cent of a group of eight pigeons within fifteen minutes after intravenous injection.

The lethal dose for twelve tinctures was determined with an average of twenty-four pigeons used for each tincture. The M. L. D. of these tinctures ranged from 0.30 to 1.05 cc. per Kg. The following dose-response chart is based upon the data obtained in these determinations:

An analysis of the above series of assays showed a very favorable consistency in the response of pigeons to fatal doses of Veratrum. It was found that for the twelve tinctures assayed the mean M. L. D. was 13.05 (A.D. ± 1.9) minimum pigeon emetic doses per Kg. This deviation of ±15 per cent shows a close relationship between the M. Em. D. and the M. L. D. for pigeons. This ratio of one to thirteen seems quite favorable from the standpoint of Veratrum toxicity.

The fact that emesis is produced by one-thirteenth the fatal dose of Veratrum is a point in favor of the emetic reaction as the end-point for the biological assay, for it would appear that the

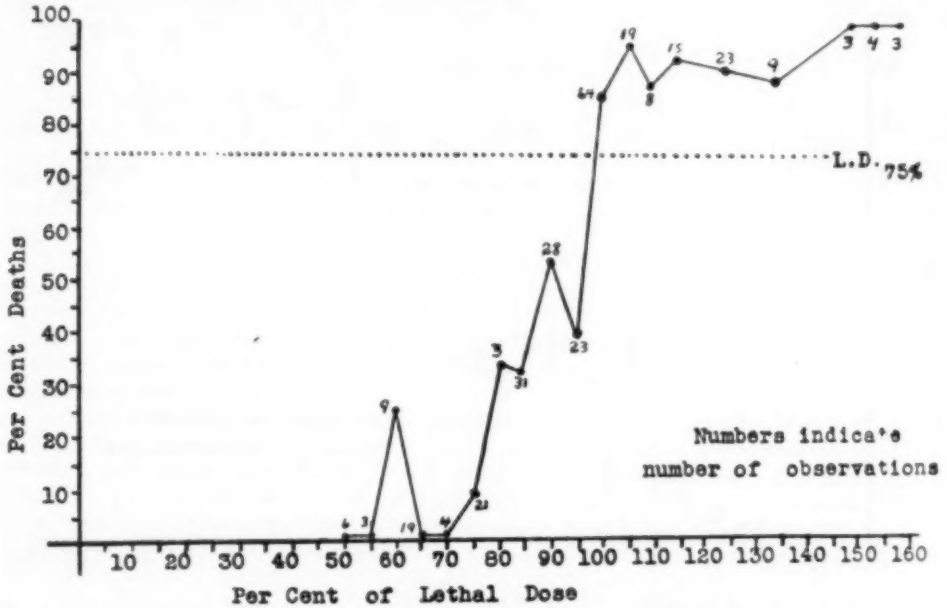

Fig. 2.—The response of pigeons to fractions of the M. L. D. The per cent deaths represents the mean for all observations at a given dose fraction.

various factors of error inherent in a biological assay would be proportionally increased with the increased dosage necessary to produce death as an end-point for an assay.

Although the minimum emetic and the minimum lethal doses of twelve tinctures of Veratrum showed close parallelism in pigeons, the M. Em. D. method is preferred for the reason that it is based upon a response to a large therapeutic dose rather than to a fatal dose. In addition, the emetic dose method is more economical as the animals can be repeatedly used.

White Mice.—The method employed was similar to those used by Rowe (6) and by Swanson and Hargreaves (7, 8). Healthy adult white mice were weighed to within the nearest 0.5 Gm. and injected intraperitoneally with freshly prepared dilutions of the tinctures, one to three, in physiological salt solution. The M. L. D. was considered as the smallest amount of the drug, expressed as cc. of the tincture per Gm. body weight, which would produce death in at least 75 per cent of a group of eight mice within one hour after the intraperitoneal injection.

Twenty-four M. L. D determinations were carried out with an average of thirty-three mice used for each assay. This dose for the fifteen tinctures used ranged from 0.0020 to 0.0080 cc. per Gm. The following dose-response chart is based upon the 784 injections made in this study:

An analysis made of six hundred and fifty mouse injections showed that mice were not as consistent in their response to Veratrum as were pigeons. Of the 130 deaths recorded from doses

below the M. L. D. only 12 per cent were from doses within 10 per cent, and 56 per cent were from doses within 20 per cent of the M. L. D. Of the recoveries from doses above the M. L. D. 53 per cent were from doses more than 20 per cent above the M. L. D.

No parallelism was found between the mouse assay and the pigeon emetic assay.

Frogs.—For several days before the M. L. D. determinations were to be made, the frogs were kept in a tank of running water at a temperature of approximately 20° C. The tincture to be used was evaporated to one tenth the original volume on a water-bath and brought to one-half the original volume with physiological salt solution. Injections of the drug were made into the ventral lymph sac, and the frogs were placed in moist jars at room temperature for observation. Over two hundred injections were made, but the method was so unsatisfactory and the response so variable that the results will not be presented.

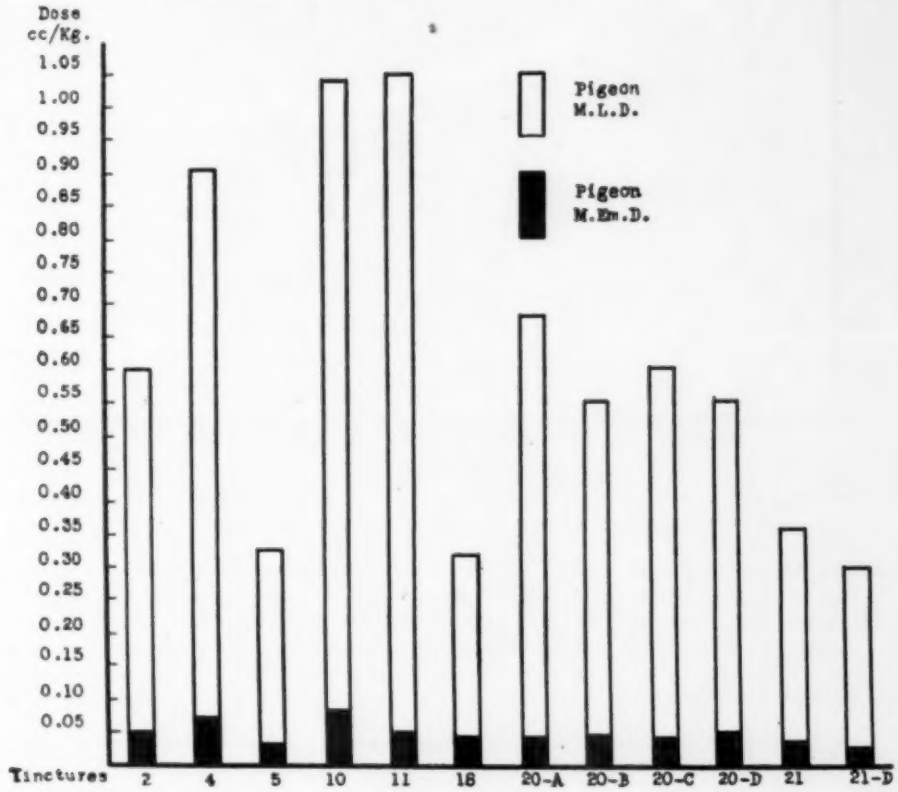

Fig. 3.—Relationship between the M. L. D. and M. Em. D. for pigeons.

Cats.—The cats were weighed and given an oral anesthetic dose of morphine-urethane. The tincture, freshly diluted with physiological saline, was injected into the femoral vein at the rate of approximately two M. Em. D. (pigeon) per Kg. per minute until the circulation failed. The characteristic effects produced by the drug are shown in Fig. 5.

Thirty-four lethal dose determinations of several tinctures of Veratrum were made but the results were exceedingly variable. An example of this variability is seen in the case of tincture No. 20-B. Seven determinations in cats gave the following doses: 18, 80, 100, 11, 33, 12 and 6 minimum pigeon emetic doses per Kg. or, expressed in volume of tincture, 0.585, 2.60, 3.25, 0.358, 1.075, 0.390 and 0.195 cc. per Kg.

Because of the inconsistency of results obtained with this method (the average of the deviations for the series of experiments was ± 71 per cent) it was concluded that the M. L. D. for cats would not furnish a satisfactory basis for the assay of Veratrum preparations.

In order to eliminate vagal activity and the influence of respiratory depression, twelve lethal dose determinations were made on cats with divided vagi, and six determinations were made on cats with artificial respiration. Approximately the same mean lethal dose and the same variability of results were obtained as in the case of normal cats.

Dogs.—The dogs were weighed, anesthetized with ether and tied on an animal board. The carotid artery was cannulated for the recording of blood pressure with a mercury manometer. The

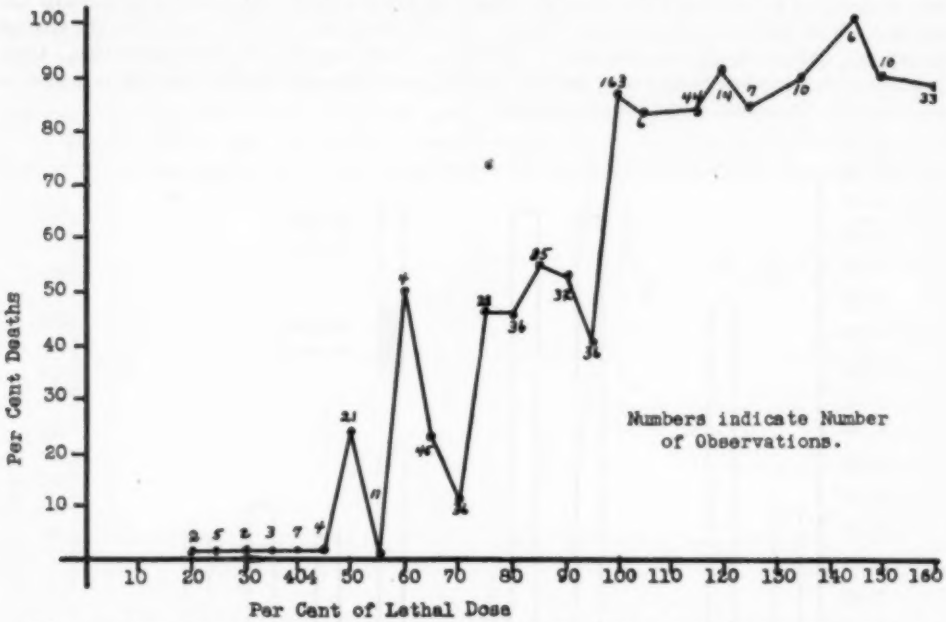

Fig. 4.—The response of mice to fractions of the M. L. D. The per cent deaths represent the mean for all observations at a given dose fraction.

injection of the tinctures, diluted with physiological salt solution, was made into the femoral vein at the rate of approximately two minimum pigeon emetic doses per Kg. per minute. Seven determinations were made, and the results were found to be as variable as with cats.

Rabbits.—The procedure followed was the same as that described for dogs except that, with rabbits, the diluted tincture was injected into the marginal ear vein. Five determinations were made, and the results were found to be more variable than with either cats or dogs.

III. THE RELATIONSHIP BETWEEN THE PIGEON EMETIC AND THE CHEMICAL ASSAY.

The alkaloidal content of several tinctures was determined by the method described by Viehoever and Clevenger (9). The results of these assays are presented in Table I.

TABLE I.—ALKALOIDAL ASSAYS OF EIGHT TINCTURES OF VERATRUM VIRIDE. FOR COMPARISON OF THE CHEMICAL AND PHYSIOLOGICAL ASSAYS, THE MINIMUM PIGEON EMETIC DOSE OF EACH TINCTURE IS GIVEN.

Tincture Number.	Total Alkaloids Per Cent.	M. Em. D. Pigeon Cc./Kg.
5	0.637	0.030
10	0.129	0.025
11	0.148	0.030
12	0.145	0.030
13	0.203	0.015
18	0.141	0.035
20-A	0.168	0.020
21-A	0.107	0.010

The above results show wide variations between the chemical and biological assays of Veratrum preparations. Tincture No. 21-A had approximately one-sixth the alkaloidal content

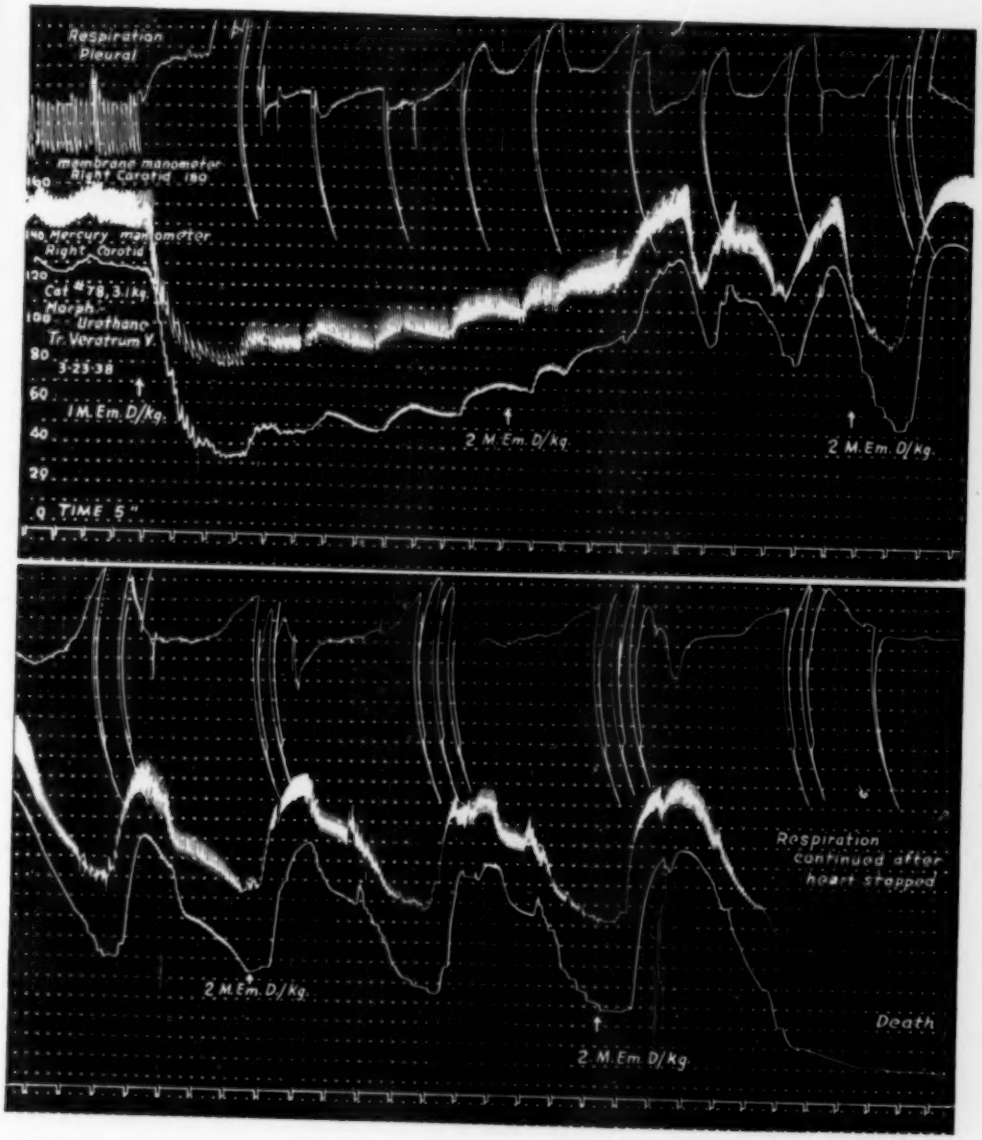

Fig. 5.—A Minimum Lethal Dose determination of a tincture of Veratrum viride on a cat.

of tincture No. 5 but possessed three times the physiological activity of tincture No. 5 as indicated by pigeon emetic assay.

IV. THE EFFECT OF p_H ON THE STABILITY OF TINCTURES.

In 1937 tinctures No. 20 and 21 were prepared from different samples of crude drug by the U. S. P. X method. Each tincture was assayed by the pigeon emetic and the mouse methods, divided into four fractions and placed in amber bottles. To the B, C and D fractions of each tincture were added increasing amounts of acetic acid and the p_H activities were determined by the

electrometric method. One year later the tinctures were again assayed and the p_H activities were determined by the same method.[1] The results of this study are presented in the following table:

TABLE II.—SUMMARY TABLE SHOWING THE RELATIONSHIP OF THE p_H ACTIVITY CHANGES TO THE PHYSIOLOGICAL ACTIVITY CHANGES OF TINCTURES OF VERATRUM VIRIDE.

Tincture Number.	p_H Activity. 1937.	p_H Activity. 1938.	M. Em. D. Pigeon Cc./Kg. 1937.	M. Em. D. Pigeon Cc./Kg. 1938.	M. L. D. Mice Cc./Gm. 1937.	M. L. D. Mice Cc./Gm. 1938.	Change in p_H	Decrease in Em. Potency Per Cent.
20-A	5.57	6.53	0.020	0.035	0.0030	0.0030	0.96	75.0
20-B	5.53	6.31	0.020	0.0325	0.0030	0.0025	0.78	62.5
20-C	5.37	5.89	0.020	0.040	0.0030	0.0030	0.52	100.0
20-D	4.87	6.29	0.020	0.050	0.0030	0.0025	1.42	150.0
21-A	5.16	6.18	0.010	0.030	0.0025	0.0025	1.02	200.0
21-B	5.06	5.99	0.010	0.035	0.0025	0.0030	0.93	250.0
21-C	5.02	6.21	0.010	0.030	0.0025	0.0025	1.19	200.0
21-D	4.93	5.96	0.010	0.020	0.0025	....	1.03	100.0

From the results presented in Table II it appears that unbuffered tinctures of Veratrum change in p_H activity on standing regardless of whether or not the original p_H was altered by the addition of an acid.

There was little or no change in the M. L. D. of the tinctures for white mice at the end of one year. This is essentially in agreement with the reports of Swanson and Hargreaves (7, 8). According to the pigeon emetic assay, however, these preparations showed a variable decrease in potency.

V. THE RELATIONSHIP BETWEEN THE PIGEON EMETIC ASSAY AND THE CIRCULATORY EFFECTS PRODUCED IN ANIMALS.

Cats.—The cats were weighed, given an oral anesthetic dose of morphine-urethane, and tied on an animal board. The carotid artery was connected to a mercury manometer for recording the blood pressure and to a membrane manometer to show more clearly the changes in the rate and amplitude of the pulse. The drug was injected into the femoral vein in the usual manner.

In the preliminary work it was noted that small intravenous doses of a tincture of Veratrum caused a rapid and pronounced fall in blood pressure, and that there was a difference in the degree of the effects produced by the injection of equal volumes of different tinctures. In the following chart is presented the summary of results of one series of thirty-two blood pressure determinations in which a definite volume (0.005 cc. per Kg.) of several different tinctures was injected. The relationship of the blood pressure effect to the pigeon emetic assay is shown.

In a second series of twenty-one blood pressure determinations, one pigeon M. Em. D. of a tincture per Kg. was injected. Although the eight tinctures used in this series differed as much as 266 per cent in potency according to the pigeon emetic assay, the blood pressure fall produced in cats was rather consistent. There was a mean blood pressure fall of 74.16 per cent with an average deviation of ±7.39 per cent.

The above results strongly indicate that the pigeon emetic assay gives a true measure of the circulatory activity of Veratrum preparations. The fact that cats respond more uniformly to sub-lethal doses of Veratrum indicates the desirability of an assay method for this drug based upon a sub-lethal response.

A series of blood pressure studies were made with cats under artificial respiration and with cats with vagi cut, but the results were more variable than were the results presented above. When the vagi are divided there is a fall in blood pressure, but the fall is more gradual and less pronounced.

Dogs.—The intravenous injection of one pigeon M. Em. D. of Veratrum per Kg. produced in seven dogs a mean blood pressure fall of 52.13 per cent (A.D. ±3.95 per cent).

Rabbits.—The intravenous injection of one minimum pigeon emetic dose of a tincture per Kg. produced in five rabbits a mean fall in the carotid blood pressure of 24.52 per cent with

[1] The p_H determinations were made by Dr. A. A. Hellbaum, Department of Physiology, University of Oklahoma School of Medicine.

an average deviation of ±10 per cent. This effect was less marked and more variable than the effects produced by the same dose of this tincture in cats and dogs.

DISCUSSION AND CONCLUSIONS.

The minimum pigeon emetic dose of tinctures of Veratrum viride can be determined with an accuracy sufficient for a biological assay of this drug. Emesis is produced rapidly and furnishes a definite and easily observed end-point. Pigeons can be used repeatedly at fourteen day intervals. This assay offers the advantages of accuracy, simplicity, speed and economy.

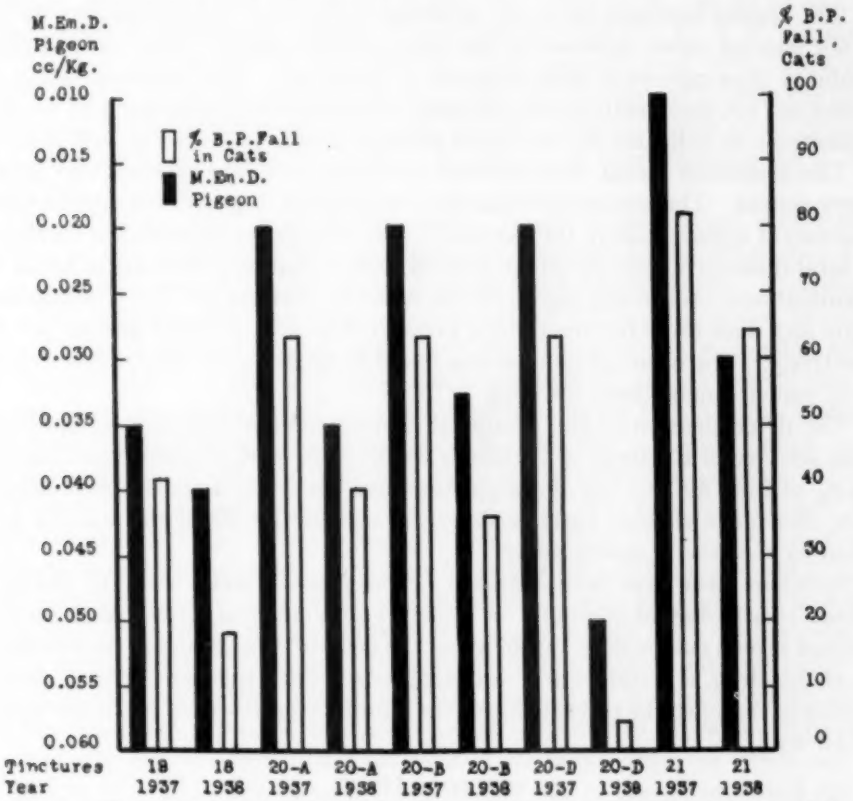

Fig. 6.—The relationship between the M. Em. D. (pigeon) and the blood pressure fall produced in cats by a dose of 0.005 cc. of tinctures of Veratrum viride per Kg.

The blood pressure response of cats and dogs to the injections of small doses of Veratrum was found to be sufficiently consistent to justify the use of this method for indicating the reliability of an assay method for Veratrum viride. The potencies of several tinctures of Veratrum as indicated by the blood pressure effects produced in cats and dogs showed a close parallelism to the potencies of these tinctures as indicated by the pigeon emetic assay.

With a sufficient rest period the pigeons do not appear to become more sensitive or to develop a tolerance for Veratrum. Variability in the response of pigeons to Veratrum does not appear to be sufficient to necessitate the "standardization" of the test animals. The presence of alcohol in the tincture does not appear to

influence the emetic dose. The "conditioning" of pigeons to spontaneous emesis was found to present no great factor of error when a fourteen-day rest period was allowed.

The minimum emetic dose and the minimum lethal dose for twelve tinctures showed close parallelism in pigeons; however, the minimum emetic dose is preferred for the reason that it is based upon a response to a large therapeutic dose rather than to a fatal dose. In addition the emetic method is more economical as the pigeons can be used over a considerable period of time. The ratio of the emetic to the lethal dose was found to be 1 to 13.

The results obtained with the minimum lethal dose determinations for mice did not parallel those obtained by the pigeon emetic assay. Mice showed greater variability than pigeons in their response to Veratrum. The minimum lethal dose for mice did not give a satisfactory measure of the physiological activity of Veratrum preparations as indicated by the blood pressure effects produced in cats and dogs.

The minimum lethal dose method for frogs gave inconsistent and unsatisfactory results. The minimum lethal dose for cats, for dogs and for rabbits showed variations of approximately 100 per cent. The wide range between the therapeutic and fatal doses of Veratrum might explain these variations obtained in lethal dose determinations. When one pigeon emetic dose of Veratrum per Kg. is administered to cats and dogs there results a blood pressure fall of 74 per cent and 52 per cent, respectively. The mean lethal dose was found to be 26 pigeon emetic doses for cats and 38 pigeon emetic doses for dogs.

The determination of the alkaloidal content gives no indication of the physiological activity of tinctures of Veratrum viride. These alkaloids are not stabilized by a p_H of from 4.87 to 5.57, for eight tinctures whose p_H activities were adjusted within this range showed variable decreases in their physiological activity as indicated by the pigeon emetic assay.

Sufficient data have been obtained on the pigeon emetic assay to justify the proposal of a biological standard for Tincture of Veratrum viride based upon the minimum pigeon emetic dose, but to avoid the necessity for changing the established dose of this drug, a standard will not be proposed until sufficient clinical data are available to establish the relationship of the minimum emetic dose to the therapeutic dose for man.

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DETERMINATION OF ARSENIC IN BISMUTH SALTS.*

BY M. W. CAREY, R. A. KONNERTH AND R. E. SCHOETZOW.[1]

Results obtained in the testing of bismuth salts for arsenic by the U. S. P. XI procedure suggested that this modification of the Gutzeit method, at least in our hands, tends to give low results on these salts or fails to disclose their full arsenic content. For a study of this question bismuth subcarbonate was chosen and a number of manufactured batches were tested "as is" and with added known amounts of arsenious oxide. The sample used was, of course, the specified 0.2 Gm. and the amount of arsenious oxide added was 0.002 mg. (10 p. p. m.) so as to find out whether when a quantity of arsenic approximating what the U. S. P. permits is added the test will disclose the full amount. The reagents used in the work were shown by test to be arsenic free and in estimating the amounts of arsenic the stains produced on the mercuric bromide test papers were compared with those obtained with known amounts of arsenious oxide in the absence of bismuth using the U. S. P XI method.

Eight bismuth subcarbonates were used. Seven of them when tested alone failed to give any stain; the other one gave a stain corresponding to less than 0.001 mg. of arsenious oxide—less than 5 p. p. m. in the 0.2-Gm. sample. Samples of these same subcarbonates were then tested with 0.002 mg. of added arsenious oxide—10 p. p. m. in the 0.2-Gm. sample. Of the seven giving no stain when tested alone one still failed to give any stain, indicating that the added arsenic was not being detected and the other six gave stains corresponding to 0.001 mg. arsenious oxide—half the amount added. The eighth sample—the one which when tested alone showed some arsenic but less than 0.001 mg. of arsenious oxide per 0.2 Gm. sample—now gave a stain corresponding to 0.002 mg. of arsenious oxide (10 p. p. m.) whereas a higher result (more than 0.002 and less than 0.003 mg. or 10–15 p. p. m.) should have been obtained. The tests on two of the eight samples—both alone and with added arsenic—were repeated and the results were the same. These data show that the test, as we have done it, does not disclose the full arsenic content of bismuth subcarbonate. Of course the amounts being worked with are small but the U. S. P. XI directs that a small (0.2 Gm.) sample be used and permits only a small amount (10 p. p. m.) of arsenic so a test, in order to be satisfactory must be sensitive enough to detect and differentiate between amounts which are less than 10 p. p. m. The fault does not reside in the size of the sample used for the test; larger amounts of bismuth subcarbonate and reagents were used but the results were not improved.

The U. S. P. X method, also a modification of the Getzeit test, gave somewhat better results. It differs from the U. S. P. XI method in using a larger amount of zinc; in using dilute sulfuric acid instead of the stannous chloride acid test solution of the U. S. P. XI which is essentially hydrochloric acid, and in not using potassium iodide in the reaction in the generator bottle. Here the standard stains were of course made using the U. S. P. X method. These tests were done using those seven of the eight bismuth subcarbonates which when tested alone using the U. S. P. XI

* Presented before the Scientific Section, A. PH. A., Minneapolis Meeting, 1938.

[1] Analytical Department of the Chemical and Pharmaceutical Laboratories, E. R. Squibb & Sons, Brooklyn, New York.

method gave no stain. In order that the findings may be compared with those obtained in the U. S. P. XI test, they are given in tabular form, together with those reported above—Table I.

TABLE I.

	U. S. P. XI.		U. S. P. X.	
Sample	"As is"	Plus 0.002 mg. As_2O_3 per 0.2 Gm. sample. (10 p. p. m.)	"As is"	Plus 0.002 mg. As_2O_3 per 0.2 Gm. sample. (10 p. p. m.)
681	No stain	No stain	No stain	Stain equivalent to 0.002 mg. As_2O_3
682	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain	Poor stain.
	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain	Stain equivalent to about 0.002 mg. As_2O_3
381	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain	Poor stain.
	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain	Stain equivalent to about 0.002 mg. As_2O_3
	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain*	Poor stain.*
	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain*	Stain equivalent to about 0.002 mg. As_2O_3*
991	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain	Stain equivalent to 0.002 mg. As_2O_3*
			No stain*	Stain equivalent to 0.002 mg. As_2O_3*
300	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain*	Stain equivalent to about 0.002 mg. As_2O_3*
			No stain*	Stain equivalent to about 0.002 mg. As_2O_3
359	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain*	Stain equivalent to 0.002 mg. As_2O_3*
			No stain*	Stain equivalent to 0.001 mg. As_2O_3*
158	No stain	Stain equivalent to 0.001 mg. As_2O_3	No stain*	Stain equivalent to 0.001 mg. As_2O_3*
			No stain*	Stain equivalent to 0.002 mg. As_2O_3*

* Because of the too vigorous reaction, the stannous chloride test solution of the U. S. P. X was omitted.

Although the U. S. P. X modification of the Gutzeit test did give better results than the U. S. P. XI modification, it is not entirely satisfactory. Thus, even after omission of the stannous chloride test solution the reaction was probably still too vigorous, and in some tests the full amount of arsenic known to be present was not found and the stains produced were not as concentrated and definite as they should be. The subject is, therefore, in need of further study, and the development of a new test or a new modification of the Gutzeit test which will regularly give accurate results regarding the arsenic content of bismuth salts should be undertaken.

ASSAY OF ELIXIR OF THREE BROMIDES NATIONAL FORMULARY VI.*

BY SAMUEL W. GOLDSTEIN[1] AND WILLIAM F. REINDOLLAR.[1]

Elixir of Three Bromides has been official in the last three revisions of the National Formulary. The assay provided for this galenical in the present edition of the National Formulary is merely a determination of total bromide. If a sufficiently valid reason exists for continuing the use of ammonium, potassium and sodium bromides combined in one preparation, the assay should indicate, at least approximately, the amounts of the individual bromides present. This investigation was undertaken to devise an assay procedure that would fulfil this requirement.

The direct determination of sodium and potassium in the past has been neglected, principally because the procedures recommended were tedious and unreliable. Barber and Kolthoff (1) published a method for the accurate determination of small amounts of sodium. Their method was based upon the precipitation of sodium with zinc uranyl acetate. Various modifications of this procedure, involving gravimetric and colorimetric determinations of the sodium uranyl zinc complex have appeared in the literature (2) (3) (4). Caley and Foulk (5) published a method analagous to that of Barber and Kolthoff using magnesium uranyl acetate as the precipitating agent. Caley and Foulk reported better results over a wide range (up to 0.050 Gm. sodium) with the magnesium reagent than with the zinc reagent; although the latter gave better results with small amounts of sodium (up to 0.008 Gm.). We have adapted Caley and Foulk's method for the determination of sodium in Elixir of Three Bromides National Formulary VI, and by employing the general procedures for the determination of ammonium bromide and total bromine, have calculated the amounts of ammonium, potassium and sodium bromides present.

EXPERIMENTAL.

Chemically pure ammonium, potassium and sodium bromides were dried to constant weight and then assayed. The values obtained for these salts were 99.98 per cent, 100.18 per cent and 100.40 per cent respectively. The high figures obtained in the latter two cases were probably caused by the presence of traces of chlorides. A standard Elixir was then prepared from these three salts, according to the official formula, containing ammonium bromide 80.0314 Gm., potassium bromide 80.0000 Gm. and sodium bromide 80.0492 Gm. per liter.

A dilution of the Elixir was prepared by measuring exactly 25 cc. and making up to a volume of 250 cc. with distilled water.

ASSAY FOR SODIUM BROMIDE.

Reagents. 1.—Solution of magnesium uranyl acetate. This solution is prepared as follows:

Solution A.		Solution B.	
Crystallized uranyl acetate	85 Gm.	Crystallized magnesium acetate	500 Gm.
Glacial acetic acid	60 Gm.	Glacial acetic acid	60 Gm.
Distilled water.	to 1000 cc.	Distilled water.	to 1000 cc.

Heat each solution separately to about 70° until the salts are dissolved, mix, allow to cool to 20°, and keep at this temperature for at least two hours to allow any excess to settle.

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* Presented before the Scientific Section, A. PH. A., Minneapolis Meeting, 1938.

[1] From the laboratories of the Bureau of Chemistry of the State of Maryland Department of Health.

Filter through a dry filter into a dry bottle. If further precipitation occurs on standing, filter before using.

2.—Alcohol (95 per cent) saturated with sodium magnesium uranyl acetate [$Mg(C_2H_3O_2)_2.NaC_2H_3O_2.3UO_2(C_2H_3O_2)_2.6^1/_2H_2O$].

Experimental.—Several modifications, such as stirring the reaction mixture for five minutes and allowing to sit over night at 20°; the use of 2-cc. samples with one half the amount of reagent; and the employment of a ten minute stirring period were tried before adopting the procedure outlined below. The results of the last named assays are recorded under C in the table.

Procedure.—Pipette 5 cc. of the dilution into a 250-cc. beaker, add 100 cc. of reagent, place in a bath at 20° and stir for thirty minutes with a mechanical stirrer (or stir vigorously by hand for five minutes, then at five-minute intervals for one hour) and allow to stand until the supernatant liquid becomes clear. Wash any adhering precipitate from the stirrer-paddle with the aid of some of the reagent. Suspend the precipitate, and filter into a tared Gooch crucible, collecting the filtrate in a large clean, dry, test-tube. Transfer the remaining precipitate into the crucible with the aid of a rubber tipped rod and the first filtrate. Wash the precipitate with several 5-cc. portions of the alcoholic solution of the sodium magnesium uranyl complex, dry in an air oven at 105° for thirty minutes and weigh. The weight of the precipitate times the factor 13.66 gives the sodium bromide content of 100 cc. of Elixir. (Each Gm. of sodium bromide is equivalent to 0.7766 Gm. of bromine.)

ASSAY FOR AMMONIUM BROMIDE.

Procedure.—Pipette exactly 10 cc. of the Elixir into a distillation flask provided with a trap and a condenser, add 250 cc. of distilled water and an excess of 50 per cent sodium hydroxide solution. Distil the ammonia into 20 cc. of *N*/2 sulfuric acid, and titrate the excess acid with *N*/2 sodium hydroxide, using methyl red T.S. as an indicator. Each cc. of *N*/2 sulfuric acid is equivalent to 0.04898 Gm. of ammonium bromide or 0.03996 Gm. of bromine.

ASSAY OF POTASSIUM BROMIDE.

Procedure.—Pipette exactly 10 cc. of the dilution (1:10) into a suitable vessel, add slowly and with agitation, 30 cc. of *N*/10 silver nitrate, 2 cc. of nitric acid and 2 cc. of ferric ammonium sulfate T.S. Titrate the excess silver nitrate with *N*/10 thiocyanate. Each cc. of *N*/10 silver nitrate is equivalent to 0.00799 Gm. of bromine. The amount of potassium bromide (x) in 100 cc. Elixir may be calculated by the following formula:

$$x = 1.489\ [A - (B + C)]$$

in which

A = Total Bromine in 100 cc. Elixir
B = Bromine as NH_4Br in 100 cc. Elixir
C = Bromine as NaBr in 100 cc. Elixir.

The factor 1.489 converts bromine to potassium bromide.

The presence of potassium may be verified by the official tests.

The Gm. of sodium bromide per 100 cc. of standard Elixir determined by the several procedures tested are given in the following table.

TABLE I.

	Procedure. A.		Procedure. B.		Procedure. C.	
	Gm. NaBr Found.	% NaBr Recovered.	Gm. NaBr Found.	% NaBr Recovered.	Gm. NaBr Found.	% NaBr Recovered.
	7.920	98.92	7.941	99.19	7.999	99.93
	7.864	98.24	7.819	97.68	7.785	97.25
	7.834	97.86	7.954	99.37	7.878	98.41
	7.781	97.20	7.893	98.60		
	7.835	97.88	7.917	98.90		
	7.931	99.08	7.986	99.76		
	7.863	98.22	8.027	100.27		
Average	7.861	98.20	7.934	99.11	7.887	98.53

A—Stirred for 30 minutes with mechanical stirrer.
B—Stirred vigorously for 5 minutes, then stirred at 5 minute intervals for 1 hour, and let stand until clear.
C—Stirred vigorously for 10 minutes, then as in B.

The assay for sodium bromide showed the presence of 7.898 Gm. of sodium bromide per 100 cc. of Elixir (average of results) which is 98.7 per cent of the theoretical, and is equivalent to 6.134 Gm. of bromine. The assay for ammonium bromide showed the presence of 7.984 Gm. of ammonium bromide per 100 cc. of Elixir (99.8 per cent of theoretical), equivalent to 6.513 Gm. of bromine. The total bromine content per 100 cc. of Elixir was found to be 18.038 Gm. of bromine. Bromine present as potassium bromide = 18.038 Gm. − (6.134 + 6.513) Gm., or 5.391 Gm. of bromine; which is equivalent to 8.027 Gm. of potassium bromide. The value found for this salt is 100.3 per cent of the theoretical.

DISCUSSION.

In the determination of sodium the stirring must be quite vigorous at all times to obtain a quantitative precipitation of the complex. The employment of the first filtrate as a transferring agent minimizes the use of alcohol. In the official assay the National Formulary provides 50 cc. of N/10 silver nitrate to assay an aliquot containing a maximum of 0.250 Gm. of mixed bromides equivalent to 23.6 cc. of the silver solution. As this is an excess greater than 100 per cent, the amount of N/10 silver nitrate employed was reduced to 30 cc.

The estimation of potassium bromide yields results in good agreement with the theoretical.

SUMMARY.

A procedure is recommended for the determination of ammonium bromide and sodium bromide and the estimation of potassium bromide in the Elixir of Three Bromides National Formulary VI.

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A STUDY OF MASTIC IN THE PREPARATION OF ENTERIC MEDICAMENTS.*,[1]

BY F. S. BUKEY[2] AND C. J. KLEMME.[3]

The object of this study was to determine the efficiency of mastic-talc and mastic-magnesium stearate as enteric coating materials. The use of talc as a drying agent is of common commercial practice in the application of an enteric coating. In one part of this study, magnesium stearate was used in place of talc, as it was

* Presented before the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

[1] An abstract of a thesis presented to the faculty of the School of Pharmacy, Purdue University, in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

[2] Assistant Professor of Pharmacy, University of Nebraska.
[3] Professor of Pharmaceutical Chemistry, Purdue University.

believed that it would serve the same purpose and in addition be directly useful in the enteric coating, since it would be converted in the stomach to stearic acid. Careful attention was paid to possible commercial adaptation of the coating methods used in this study. The efficiency of these coatings was determined by radiographic methods similar to those previously reported by Bukey and co-workers.

A pill of barium sulfate, $^{9}/_{32}$ inch in diameter, was the form of medicament used. The mastic was of pharmaceutical grade and in order to insure a clean product was dissolved in ether, filtered and the ether removed by evaporation on a steam-bath. The mastic solution used for coating was 25 per cent dissolved in methyl propyl ketone. A laboratory size coating pan was used.

In preparing the pills with the mastic-talc coating, a desired number were placed in a rotating pan and then thoroughly wet with the mastic solution. The rotating pills were prevented from massing as the solvent evaporated by the addition of small amounts of finely powdered talc. Five coats of the resin applied in this way were necessary before tests in 0.3 per cent hydrochloric acid indicated sufficient durability to warrant a radiographic examination. It was found on weighing lots of twenty-five pills that they had increased in total weight 0.40 Gm.

The application of the mastic-magnesium stearate was similar to that just described. Considerable care must be taken not to add too much magnesium stearate to the rotating pills when they begin to mass in the pan, otherwise they will become lumpy. Since this combination does not dry as rapidly as mastic-talc, it was necessary to thoroughly dry the pills before the application of the next coat. Six coats were necessary before the hydrochloric acid test indicated sufficient durability. It was found in the case of this coating that the average for lots of twenty-five pills was an increase in total weight of 0.26 Gm.

The radiographic study was first made on the mastic-talc and then the mastic-magnesium stearate coating. The results were based on one hundred experiments in each case. Fifty subjects were selected and duplicate experiments were conducted for both coatings. These individuals ingested 400 pills and in making the radiographic study, 936 radiographs were taken.

In making the radiographic study of the mastic-talc coating, the experiments were conducted, in most cases, over a period of fifteen hours. Some pills had shown no signs of disintegration by the end of this time so they were located and listed as undetermined. It will be noted in the tables that the most of these pills were well advanced in the alimentary tract at this hour. Table I gives, in a condensed form, the results obtained for this coating. The calculation of percentage was based on the total number of pills ingested. These values were determined for the

TABLE I.

Pills Which Disintegrated.

Stomach	15 pills	7.5 per cent
Small Intestine	26 pills	13.0 per cent
Ascending Colon	71 pills	35.5 per cent
Transverse Colon	11 pills	5.5 per cent
Descending Colon	13 pills	6.5 per cent
Total	136 pills	68.0 per cent

Pills of Undetermined Location at Time of Disintegration.

Stomach	8 pills	4.0 per cent
Small Intestine	5 pills	2.5 per cent
Ascending Colon	28 pills	14.0 per cent
Transverse Colon	14 pills	7.0 per cent
Descending Colon	8 pills	4.0 per cent
Lost	1 pill	0.5 per cent
Total	64 pills	32.0 per cent

various locations, both for the pills that disintegrated and for those for which the location of the point of disintegration was undetermined when the last radiograph was taken.

If one considers the efficiency of an enteric coating as the percentage disintegration in the intestinal tract, then the efficiency of the mastic-talc coating would be 60.5 per cent. Since the highest percentage, 35.5 per cent, disintegrated in the ascending colon, and only 13.0 per cent in the stomach, one might consider this mixture as a relative efficient material. On the other hand, 27.5 per cent of the pills remained undetermined in the intestinal tract for a period too long for proper medication. If one assumed that the bulk of any medicament is absorbed through the small intestine or ascending colon, then the enteric efficiency of a coating should be based on disintegration in these two regions. Applying this theory of efficiency to the mastic-talc coating, it was found to have a value of 48.5 per cent. Although this idea of determining percentage efficiency has not been used, it would seem to be the logical approach to the problem.

Table II was compiled from the data collected on the mastic-magnesium stearate experiments over the fifteen hour period.

TABLE II.

Pills Which Disintegrated.

Stomach	60 pills	30.0 per cent
Small Intestine	77 pills	38.5 per cent
Ascending Colon	48 pills	24.0 per cent
Transverse Colon	3 pills	1.5 per cent
Total	188 pills	94.0 per cent

Pills of Undetermined Location at the Time of Disintegration.

Stomach	3 pills	1.5 per cent
Small Intestine	1 pill	.5 per cent
Ascending Colon	4 pills	2.0 per cent
Descending Colon	2 pills	1.0 per cent
Lost	2 pills	1.0 per cent
Total	12 pills	6.0 per cent

A comparison of these tables shows that the mastic-magnesium stearate coating was more efficient than the mastic-talc. This statement is based on the fact that a higher percentage of pills disintegrated in the small intestine and fewer in the transverse colon. There were fewer pills undetermined and of these only six were in the colon at the time of the last radiograph. It would seem that these advantages would more than compensate for the increased disintegration in the stomach.

SUMMARY.

1. That the efficiency of the mastic-talc coating was found to be 48.5 per cent as compared with 62.5 per cent for mastic-magnesium stearate.

2. That the efficiency of the mastic-talc coating was not sufficiently high to warrant its recommendation for use on enteric medicaments. However, it must be remembered that this material has a higher efficiency value than such material as shellac, shellac-salol, which are in common commercial use.

3. That the efficiency of mastic-magnesium stearate as an enteric coating material was sufficiently high to warrant its recommendation to the pharmaceutical manufacturers.

4. That both the mastic-talc and the mastic-magnesium stearate coating were applicable to factory methods in which the coating pan is used.

5. That a high-boiling solvent such as methyl propyl ketone (B. P. 102° C.) was a better solvent for the mastic than the more volatile solvents, such as acetone (B. P. 56.5° C.) since the higher boiling solvent did not produce blisters in the coating.

6. That it is possible to determine the entirety of an enteric coating from the weight of the enteric material adhering to the pill, capsule or tablet, assuming they were uniform in size. The determination was based on the average gain in weight for lots of twenty-five or more pills, capsules or tablets.

7. That for a better degree of enteric efficiency, it was found advisable to make this determination from the number of pills disintegrating in the small intestine and the ascending colon, since absorption from the transverse and descending colons would not be as complete.

SULFANILAMIDE ADDITION COMPOUNDS WITH CINCHONA-ALKALOIDS.*

BY E. H. STUART, H. M. POWELL, C. L. ROSE AND F. E. BIBBINS.*

In 1935 Domagk (1) announced that certain azo dye derivatives were specific remedies in the treatment of infections by beta hemolytic streptococcus. Out of this work came *p*-aminobenzenesulfonamide, officially named by the Council on Pharmacy and Chemistry of the American Medical Association, "Sulfanilamide" (2). This compound has proven to be one of the outstanding developments in the field of chemotherapy during recent years. There has been an increasing amount of evidence with regard to the extraordinary effectiveness of sulfanilamide against various infections with the result that it is now reported as having been tried in the treatment of a great variety of diseases, including malaria.

The chemotherapeutic action of the sulfanilamide compounds on malaria reported in the literature are both favorable and unfavorable although the total number of favorable case reports far exceed the unfavorable ones. Hill and Goodwin, Jr., (3) reported on the use of 2,4-di-aminoazobenzene-4′-sulfonamide (4) in one hundred cases of plasmodium vivax malaria with beneficial results. Read and Pino (5) used 2,4-diaminoazobenzene-4′-sulfonamide in three cases of plasmodium

* From the Control Laboratories, Eli Lilly and Company.

vivax malaria with negative results. Van der Wielen (6) used 2,4-diaminoazobenzene-4′-sulfonamide in two cases of quartan malaria with favorable results. Faget (7) reported unfavorably on four cases (two of plasmodium vivax, one case of plasmodium falciparum and one case of plasmodium malariæ) treated with sulfanilamide and 2,4-d aminoazobenzene-4′-sulfonamide. He stated that quinine had to be administered before recovery. Pakenham-Walsh, Oxon and Rennie (8) reported good results on benign tertian malaria in one case treated with 2,4-diaminoazobenzene-4′-sulfonamide. Hall (9) treated four cases of tertian malaria with 2,4-diaminoazobenzene-4′-sulfonamide and sulfanilamide (4) with unfavorable results.

In 1937 de Leon (10) treated fifteen cases of benign tertian fever with success using 2,4-diaminoazobenzene-4′-sulfonamide. In 1938 de Leon (11) reported again on the advantages of sulfanilamide in the treatment of malaria, in which he stressed the fact that sufficient doses of sulfanilamide must be used in order to get good results. Coggeshall (12) stated that sulfanilamide was found to have a prophylactic value and a marked therapeutic effect on acute plasmodium knowlesi infections in rhesus monkeys. Chopra and Das Gupta (13) found that disodium *p* (γ-phenylpropylamino) benzenesulfonamide α-γ-disulfonate and 2,4-diaminoazobenzene-4′-sulfonamide were effective for plasmodium knowlesi infection in rhesus monkeys.

We have recently found that sulfanilamide will form compound salts with the cinchona-alkaloids similar to quinine and urea hydrochloride. These compounds are homogeneous crystalline salts of the cinchona-alkaloid and sulfanilamide in molecular proportions. They have definite physical and chemical properties. For instance, they form definite crystals, and those crystals usually have definite melting points. The sulfanilamide component cannot be separated from the cinchona-alkaloid component of the crystals by extraction with acetone, as is the case of mixtures of sulfanilamide and quinine salts. The crystals of most of the compounds are yellow in color, although a few are white, whereas both the sulfanilamide and the common cinchona-alkaloid salts are white in color. The crystals are homogeneously soluble in various solvents and usually have a solubility which is different both from that of the sulfanilamide and from that of the cinchona-alkaloid salt.

In order to prepare a cinchona-alkaloid sulfanilamide salt it is necessary that there be a sufficient amount of a strong mineral acid present, such as one of the halogen acids, a sulfonic acid or sulfuric acid, to satisfy the acid-combining power of the cinchona-alkaloid component. That is, assuming that hydrochloric acid (a monobasic acid) is the acid, there must be at least two molecules of hydrochloric acid, or if sulfuric acid (a dibasic acid) is the acid, there must be at least one molecule of sulfuric acid for each molecule of the cinchona-alkaloid component. More acid than the amount named above may be present in the reaction, and in the case of quinine and quinidine, but apparently not in the case of cichonine and cinchonidine, the crystals which are obtained in the presence of the excess acid may contain a higher percentage of acid, apparently enough more to satisfy the acid-combining power of the sulfanilamide component also.

PREPARATION OF QUININE SULFANILAMIDE H_2SO_4.

Add to 30 cc. distilled water 4.2 Gm. of quinine bisulfate and 1.7 Gm. of sulfanilamide. Mix thoroughly and heat until all the material is in solution. The crystals form on cooling somewhat below room temperature. They may be easily recrystallized by dissolving in about 30 cc. boiling distilled water and cooling.

Analysis shows that the quinine sulfanilamide bisulfate made by the above method contains quinine and sulfanilamide in substantially molecular proportions associated with one molecule of sulfuric acid. The crystals are white and melt at 208° C., corrected. They have a specific optical rotation using a 2.5 per cent solution in water of $[\alpha]_D^{25°}$ C. $= -147°$.

PREPARATION OF QUININE SULFANILAMIDE $1^1/_2$ H_2SO_4.

This compound is similar to the preceding example except that instead of using 30 cc. of water at the outset 5 cc. is used containing 0.5 cc. of concentrated sulfuric acid, and the compound is recrystallized from 5 cc. of water rather than from 30 cc. Analysis shows that these crystals contain quinine and sulfanilamide in substantially molecular proportions, associated with one and one-half molecules of sulfuric acid. The compound is white and has a melting point of 186° C., corrected; and a specific optical rotation, as observed in a 2.5 per cent solution in water of $[\alpha]_D^{25°}$ C. = − 112°.

In the preparation of the above compounds alcohol may be used as the solvent in place of water.

By using a similar method the compounds indicated in the following table have been prepared:

TABLE I.—CINCHONA-ALKALOID SULFANILAMIDE COMPOUNDS.

Compounds.	M. P.	$[\alpha]_D^{25°}$ C.	Color of Crystals
Quinine Sulfanilamide 2 HCl (1 mol. water of cryst.)	110° C.	−150°	Yellow
Quinine Sulfanilamide 2HCl (Anhydrous)	130° C.	−155°	Yellow
Quinine Sulfanilamide 3HCl	150° C.	−144°	Light yellow
Quinine Sulfanilamide 2HBr	211° C.	−126°	Light yellow
Quinine Sulfanilamide 2HI	about 70° C.	−92.5°	Yellow
Quinine Sulfanilamide H_2SO_4	208° C.	−147°	White
Quinine Sulfanilamide $1^1/_2$ H_2SO_4	186° C.	−112°	White
Quinine Sulfanilamide Sulfamic Acid	133° C.	−131°	Light yellow
Quinine Sulfanilamide Sulfanilyl Sulfanilic Acid	153° C.	...	White
Quinidine Sulfanilamide 2HCl	about 135° C.	+170°	Yellow
Quinidine Sulfanilamide 2HBr	about 130° C.	+137.5°	Yellow
Quinidine Sulfanilamide H_2SO_4	172° C.	+164°	Light yellow
Quinidine Sulfanilamide $1^1/_2$ H_2SO_4	125° C.	+152°	Yellow
Euquinine Sulfanilamide 2HCl	about 135° C.	−55°	Yellow
Euquinine Sulfanilamide 2HBr	about 135° C.	−43°	Yellow
Euquinine Sulfanilamide H_2SO_4	91° C.	−51.5°	Yellow
Cinchonine Sulfanilamide 2HCl	about 135° C.	+132°	Yellow
Cinchonine Sulfanilamide 2HBr	about 130° C.	+112°	Yellow
Cinchonine Sulfanilamide H_2SO_4	about 120° C.	+123.5°	Yellow
Cinchonidine Sulfanilamide 2HCl	about 136° C.	−93.7°	Yellow
Cinchonidine Sulfanilamide 2HBr	about 135° C.	−78°	Yellow
Cinchonidine Sulfanilamide H_2SO_4	180° C.	−92.5°	Cream

TABLE I.—CINCHONA-ALKALOID SULFANILAMIDE COMPOUNDS. (*Continued from page 92.*)

Compounds.	M. P.	$[\alpha]_D^{25}$° C.	Color of Crystals
Quinine 4, 4 Diaminodiphenyl Sulphone H_2SO_4	176° C.	...	Yellow
Quinine Disulfanilamide 2 HCl (14)	115° C.	...	Yellow
Quinine Disulfanilamide H_2SO_4	207° C.	−145°	White
Quinine N^1 Hydroxysulfanilamide H_2SO_4 [a,b]	187° C.	...	White
Quinine *P*-benzylaminobenzenesulfonamide H_2SO_4 [b]	104° C.	...	Light yellow
Quinine *P*-mandelylaminobenzenesulfonamide H_2SO_4 [b]	190° C.	...	White
Quinine 2 (*p*-aminobenzenesulfonamide) pyridine H_2SO_4 [b]	139° C.	...	Light yellow

[a] The system of naming as given in *J. American Chemical Society*, Vol. 60, page 2217.

[b] It is of interest to note that in the case of these compounds the sulfanilamide has been substituted on either the amino or the amide portion of the molecule without preventing the formation of the compounds with the cinchona-alkaloids.

In the few cases where the optical rotation is not given the compounds were not sufficiently soluble in water to make this determination.

ACTION OF CERTAIN OF THESE COMPOUNDS ON MICE INFECTED INTRAPERITONEALLY WITH HEMOLYTIC STREPTOCOCCUS.

Sixteen hour serum broth culture of streptococcus "Todd" was used to make serial decimal dilutions in chilled broth. Within one-half hour nine test mice, in groups of three, received doses of 10^{-2}, 10^{-3} and 10^{-4} cc., respectively, while control mice in pairs received doses of 10^{-2}, to 10^{-9} cc. of the streptococci thus prepared intraperitoneally (see Table II). The various groups of test mice received drug treatment as indicated.

Quinine sulfanilamide 3 HCl and sulfanilamide seem to be equally efficient chemotherapeutically as shown in Table II. The remaining compounds were less effective against streptococcal infection, but nearly all showed some degree of effectiveness.

ACTION OF THESE COMPOUNDS ON MICE INFECTED INTRAPERITONEALLY WITH STAPHYLOCOCCI COATED WITH MUCIN TO ENHANCE VIRULENCE.

The following compounds in doses indicated, have also been subjected to standardized mouse therapeutic tests against staphylococcal infected mice, mucin coated staphylococci being used for establishing infection.

All compounds were tested on six mice, three mice receiving 1000 M. L. D. and three receiving 10,000 M. L. D. of culture. The therapy comprised two subcutaneous doses given one hour and three hours after infection.

1. Quinine 4,4-diaminodiphenyl sulfane bisulfate—5 mg.
2. Quinine sulfanamide N'Hydroxysulfanilamide sulfate—5 mg.
3. Quinine sulfanilamide camphorsulfanate—0.5 mg.

None of these compounds showed any efficacy toward staphylococcal infection in mice inasmuch as test mice and control mice died after the same period of time.

ACTION OF THESE COMPOUNDS ON MICE INFECTED WITH INFLUENZA VIRUS.

The following compounds, in doses indicated have been subjected to standardized mouse therapeutic tests against influenza virus. These compounds were tested in groups of eight mice, two mice being infected intranasally with virus dilutions 1–10, 1–100, 1–1000 and 1–10,000, respectively, with the exception of compound No. 4 which was tested on six mice, three mice being infected with virus dilutions 1–10 and 1–100, respectively. Untreated virulence controls of the virus were included. All the mice used in these tests were Swiss mice. Four doses of drug were given subcutaneously to the different groups of test mice, one dose being given on the same day as the virus and one dose on each of the next three days.

1. Quinine sulfanilamide 2HCl—5 mg.
2. Quinine sulfanamide N'Hydroxysulfanilamide sulfate—5 mg.
3. Quinine 4,4-diaminodiphenyl sulfone bisulfate—5 mg.
4. Quinine sulfanilamide camphorsulfonate—0.5 mg.

None of the above compounds showed any efficacy against influenza virus, inasmuch as treated test mice died along with untreated controls, or on the weaker dilutions of virus the treated and untreated mice showed the same degree of pulmonary lesions upon autopsy at the end of the standard 14-day observation period.

TABLE II.—CURATIVE TEST OF STREPTOCOCCUS-INFECTED MICE.

Compounds.	Drug* Dose in Mg.	Dose of Streptococcus "Todd" in Cc. 10^{-3}.	10^{-4}.	10^{-5}.	10^{-6}.	10^{-7}.
Quinine Sulfanilamide 2 HCl	5	SSS	SSD	SSD		
Quinine Sulfanilamide 3 HCl	5	SSD	SSS	SSS		
Quinine Sulfanilamide H_2SO_4	5	SDD	DDD	SSS		
Quinine Sulfanilamide Camphorsulfonate	0.5	DDD	SDD	SDD		
Cinchonidine Sulfanilamide H_2SO_4	5	SDD	SDD	SSS		
Cinchonine Sulfanilamide H_2SO_4	5	SSD	SSD	SSD		
Quinidine Sulfanilamide H_2SO_4	5	SDD	SSS	SDD		
Euquinine Sulfanilamide H_2SO_4	5	SSD	SSD	SSD		
Quinine Disulfanilamide 2 HCl	5	SSD	SSS	SSD		
Quinine 4, 4-Diaminodiphenyl Sulfone H_2SO_4	5	SSD	SSS	SSD		
Sulfanilamide	5	DSS	SSS	SSS		
Untreated Control	..	DD	DD	DD	DD	SS

S—mouse surviving D—mouse died of infection Duration of test—14 days

* The drug dose indicated was administered subcutaneously one hour and five hours after infection.

TABLE III.—TOXICITY OF CERTAIN OF THESE COMPOUNDS BY INTRAVENOUS INJECTION IN MICE.

Substance.	Mg./Kg.	No. Mice Died.	No. Mice Used.
Euquinine Sulfanilamide Bisulfate	50	0	3
	70	0	3
	80	3	3
Quinidine Sulfanilamide Bisulfate	120	1	4
	130	3	5
	140	3	4
Cinchonidine Sulfanilamide Bisulfate	150	2	5
	160	3	4
	200	3	3
Quinine Sulfanilamide Bisulfate	160	0	3
	170	3	5
	180	3	3
Cinchonine Sulfanilamide Bisulfate	220	1	4
	230	3	4
	250	3	4

THE ACTION OF THE CINCHONINE SULFANILAMIDE BISULFATE AGAINST PLASMODIUM RELICTUM IN CANARIES.

Cinchonine sulfanilamide bisulfate, the least toxic of this group, was tested according to the method of Tate and Vincent (15). These authors reported 2.5 mg. of quinine hydrochloride per 20 Gm. as being the minimal effective dose and 10 mg. per 20 Gm. of the canaries weight, the

maximal tolerated dose. We have used, therefore, doses of cinchonine sulfanilamide bisulfate approximately equivalent to 10 and 2.5 mg. of quinine hydrochloride per 20 Gm. of the canary body weight. In addition one dose equivalent to 2 mg. per 20 Gm. of the bird's weight has been administered. None of these doses produced sterility in the canaries and although the largest dose caused some apparent lag in the rate of appearance of the parasites in the blood stream of the canaries, it was no more than might be expected by treating the birds with cinchonine alone.

THE ACTION OF QUININE SULFANILAMIDE DIHYDROCHLORIDE AGAINST PLASMODIUM RELICTUM IN CANARIES.

Coggeshall (12) in a recent report showed that sulfanilamide alone was ineffective against plasmodium cathemerium infections in canaries or plasmodium lophuræ infections in young chicks.

We have tried, in addition to cinchonine sulfanilamide bisulfate, quinine sulfanilamide dihydrochloride as well as sulfanilamide alone against plasmodium relictum in canaries. In the case of sulfanilamide, there was no response, thus confirming in part Coggeshall's findings. With the use of quinine sulfanilamide dihydrochloride there was a definite lag in the rate of appearance of the parasites as compared with untreated but innoculated control birds, this lag, as in the preceding case, seemed to be in proportion to the amount of quinine given, rather than to the quantity of whole drug.

SUMMARY.

1. The preparation of sulfanilamide addition compounds with cinchona-alkaloids has been described.

2. Several of these new compounds have indicated promising chemotherapeutic activity against experimental hemolytic streptococcus infections when given in proportion to their sulfanilamide content.

3. None of the new compounds tested have shown indications of effectiveness in chemotherapy of staphylococcus infections or of human influenza virus infections in Swiss mice.

4. Those of the new compounds tested in chemotherapy of malaria infected canaries have been active only in proportion to their cinchona-alkaloid content.

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SURVEY OF THE PRESENT-DAY PRESCRIPTION.*

BY FREDERICK LASOWSKY.[1]

In undertaking this survey, it was our purpose to determine the answer to the following questions:

1. What are some of the writing habits and peculiarities of our physicians?
2. Do prescriptions calling for Vitamins, Barbiturates and Glandular Products constitute a significant proportion of our practice?
3. How frequently does the proprietary product appear on the "present day prescription" compared to the official ingredient?

The results which are presented were compiled from a survey of 5000 new prescriptions filled by G. Fox & Co. of Hartford, Conn. during the months of May and June 1938. Copies of prescriptions originally filled at other drug stores, and prescriptions that were telephoned in by the physician were not considered in this survey, since it was desired to study the writing habits of the physicians themselves.

The prescriptions studied were written by approximately 350 physicians residing in Connecticut, Massachussetts, Rhode Island and New York.

Some of the facts determined are of casual interest only; others are of considerable significance. In the former category, for example, we may place the discovery that over 7% of our prescriptions were written in pencil. This, of course, is undesirable, since the handling of the prescription may cause smudging and render it illegible.

It is generally understood that Latin is the universal language of the prescription. Yet, in less that one-fourth the prescriptions studied, was Latin used to prescribe the ingredients. In only one out of five instances was Latin employed in writing the directions for the patient, and in these cases it was mostly simple, abbreviated Latin. The great majority of prescriptions was written in English or in a mixture of English and abbreviations.

An interesting fact revealed by the survey is the overwhelming preference shown by physicians for the apothecary system of weights and measures. For several years now the metric system has been advocated as the more exact. It is admitted to be much simpler to calculate percentage solution in the metric system than in the apothecary system. Medical Journals reveal the cubic centimeter and the gram as the preferred terms in which to express the results of scientific experiments. Yet, 87% of the prescriptions were written in the apothecary system.

It is important, from a legal point of view at least, that every prescription bear the name of the person for whom it is intended, the date on which it is written and the signature of the physician. Our survey revealed that many physicians were careless in this regard. The patient's name appeared on only half the number of prescriptions, the date was written even less frequently and on approximately 20% of the prescriptions, the full signature of the physician was lacking.

In making this study, we thought it a matter of considerable interest to the profession to determine the type of prescription which the present-day physician seems to prefer. The pharmacist has often been referred to as a "pill roller." This

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* Presented before the Section on Practical Pharmacy and Dispensing, A. PH. A., Minneapolis Meeting, 1938.

[1] Prescription Department, G. Fox & Co., Hartford, Conn.

may have been true in the past, but as far as we are concerned, the title may no longer be justifiably applied. In 5000 prescriptions not a single one directed "mix et ft. pilulæ." What type prescription then, does the physician write most frequently? The preferred media, it appears, is the liquid. 43.1% of all the prescriptions studied were found to be liquids. Of this group approximately 60% had to be compounded by the pharmacist.

Tablets and pills were found to constitute 32% of our prescription volume; capsules accounted for 11.4%; ointments for 6.8%; powders for 5.7% and suppositories for slightly under 1%. Only one prescription in 400 called for a suppository that had to be manufactured by the pharmacist; approximately half the ointments and the powders had to be compounded; and three-fourths of the capsule prescriptions were found to call for items that required no compounding. This latter condition is partially explained by the fact that many of the proprietary vitamin preparations which are being prescribed with increasing frequency appear in capsule form. We believe the figures to be significant in that they indicate the path along which present-day medicine is proceeding.

It is generally accepted that medical science has made remarkable progress during the past few years in the fields of vitamin and of hormone therapy. It has been claimed by some that preparations of this class now contribute over 25% of our dollar volume. In our survey we attempted to determine the proportion of prescriptions which called for ingredients glandular or vitamin in nature. We discovered that approximately one out of every nine prescriptions called for a vitamin product and one out of every eighteen contained a glandular ingredient. Thus it is seen that 16% of our total volume is contributed by preparations which were seldom, if ever, prescribed ten or fifteen years ago. Since most of these vitamins and glandular products are rather expensive, it may be safely estimated that they constitute at least 20% to 25% of our prescription dollar volume.

During the last five years or so the market has been flooded with many derivatives of barbituric acid. Several states have considered the unregulated sale of barbiturates a menace to the public health and have enacted legislation preventing their sale without a prescription. Connecticut has no such law at present. It would be interesting to determine what proportion of our barbiturate sales at present are made over the counter and what per cent are sold on prescription. In this survey, we simply determined the proportion of prescriptions which called for a member of the barbital group, either alone or in combination with other ingredients. 11.4% of all prescriptions were found to fall into this classification. This percentage will undoubtedly be increased considerably when the sale of barbital compounds is restricted to prescriptions only.

Within recent years, there has been considerable concern over the extent to which proprietary products have replaced official preparations. Several methods have been suggested by which the physician might be induced to prescribe official ingredients rather than proprietary compounds. Several years ago the National Drug Store Survey found that proprietaries accounted for 20.5% of the total number of ingredients used in filling prescriptions. The results of our survey showed, however, that proprietaries constituted 32% of the total. The constant development of new preparations by the drug houses and the present vogue of vitamin therapy partially explain this situation.

It is hoped that our survey has helped reveal some of the preferences and peculiarities of the present-day prescription writer. If the facts we have brought out are not entirely a source of satisfaction, they at least point in what direction professional pharmacists must bend their efforts to secure the desired improvements.

ADDITIONAL NOTES ON TRAGACANTH JELLY.*

BY ADLEY B. NICHOLS.**

At the 1937 Convention of the AMERICAN PHARMACEUTICAL ASSOCIATION, the writer reported on the "Evaluation of Tragacanth and Tragacanth Mucilages,"[1] in the hope that a means of establishing uniformity in the viscosity of Ephedrine Jelly might be accomplished eventually.

The N. F. VI formula for the jelly calls for 1 per cent of tragacanth but various operators have reported unsatisfactory results with the final product, the general opinion being that the jelly is too thin. When the product was first proposed with a larger amount of tragacanth included in the original formula, mixed criticism resulted, some stating that the product was too thick, while others claimed it was too thin and again some considered it to be of about the proper consistency. The cause of the difficulty obviously was to be found in the variety or lot of tragacanth being used to produce the jelly, poorer varieties giving weak gels while the better varieties gave correspondingly firmer gels.

In the previously mentioned paper a method of evaluating tragacanths was presented, whereby the speed of a steel ball through a given column of the gel was determined. The time required for the ball to travel its course was interpreted in terms of relative tragacanth value, the results of a series of experiments with each variety of tragacanth being plotted, dilution *versus* the log of the seconds of time. Certain lots of tragacanth were seen to be undesirable according to the results obtained, while for the others it seemed entirely practical to refer to the curves on the graph and from these to calculate the necessary amount of any tragacanth to use for the preparation of a gel of predetermined consistency.

During the course of the original experiments it was recognized that with age, tragacanth gels became more firm, a matter for consideration if uniformity was to be established. In a series of experiments designed to determine the effect of age upon viscosity, jellies were made with five different lots of tragacanth, the amount of each tragacanth used varying according to its own graph curve, so that all jellies would be of nearly the same consistency or viscosity. Approximations were made usually to the nearest unit of five in terms of water ratio, with the final result that the first ball readings of the finished products were recorded as: 33, 40, 43, 39 and 28 seconds, comparatively close for such a relatively low reading. Readings were then repeated at intervals, first of a few days each, then monthly and later of longer periods.

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* Presented before the Section on Practical Pharmacy and Dispensing, A. PH. A., Minneapolis meeting, 1938.

** Pharmacy Laboratory, Philadelphia College of Pharmacy and Science, Philadelphia, Pa.

[1] JOUR. A. PH. A., 26, 823 (1937).

In Table I will be found the results of the various readings, showing a general increase even on the third day and progressing definitely from thereon. However, a striking increase will be noted for tragacanth No. 1 over the others and a slight increase of Nos. 13 and 15 over 9 and 14, those of each pair, however, comparing fairly well with each other. It will thus be noted that the so-called poorer tragacanths show a greater increase in the viscosity of their gels upon aging than do the apparently better grades, indicating that there is yet an undetermined factor involved. Specimen No. 1 is one which has been in the laboratory for many years, more or less exposed during a good portion of that time. Likewise Nos. 13 and 15 were older samples, the actual age being unknown to the writer, while Nos. 9 and 15 were tragacanths purchased at the time the original experiments were undertaken. Thus it may be that the aging of the tragacanth results in such a dehydration that the full effect of the gel consistency cannot be determined in a short period of time and cannot be judged in comparison with a fresher specimen. As time progresses there will be an opportunity to check these tragacanths again to see the results of aging the crude drug itself. It is definitely recognized that powdered gums give lower gel values than the whole gum of the same lot, which may be due to this same consideration, gums usually requiring heat and further drying before they are capable of being powdered. A determination of moisture content therefore may be an aid in the solution of the problem.

TABLE I.

Tragacanth Number.	Ratio 1 Gm. Trag. to—Cc. of Water.	Rate of Fall of Ball in Seconds. 1 Day.	3 Days.	6 Days.	15 Days.	1 Mo.	2 Mos.	3 Mos.	4 Mos.	5 Mos.	7 Mos.	10 Mos.
1	48	33	46	59	114	190	350	464	785	915	1400	
9	90	40	48	53	67	95	125	114	139	145	165	x
13	70	43	53	66	89	129	200	213	353	338	x	x
14	80	39	46	51	71	85	122	131	131	155	216	x
15	60	28	38	47	78	120	180	220	410	223	x	x

Effect of age upon the viscosity of tragacanth gels.

The tragacanth gels shown in Table I were prepared from tragacanth and water, and preserved with the three oil-like ingredients found in the jelly of Ephedrine Sulfate, namely, methyl salicylate, eucalyptol and oil of dwarf pine needles. Five hundred cc. of gel was prepared in each case and stored in a liter bottle. Each test for viscosity required the opening of the stock container, the pouring out of a large test-tube full of material upon which the test was actually made and the return of that material to the stock container after the completion of the test. Naturally, every time the container was opened and handled in this manner, there was ample opportunity for the loss of vapors of the preserving mixture, leading eventually to a depletion of the preservative sufficient to permit spoilage. This is believed to account for the decomposition encountered in the specimens, beginning apparently in the fifth month in one case and noticed in the seventh and tenth months in others. This decomposition of tragacanth gels is characteristic where proper preservatives are not used and the suggestion has been made that a gel buffered by the addition of 1.6 Gm. of sodium phosphate per 1000 Gm. would solve the difficulty. It seems doubtful, however, whether this is necessary or would even

work. At least in a series of gels prepared at the same time as those represented by the Table I experiments, but opened not at all, or at least but occasionally during the year, there is no sign whatever of any decomposition. A duplicate set prepared with the added sodium phosphate appears no different from the controls it duplicates. It must be remembered also that Jelly of Ephedrine Sulfate should be dispensed and used from a tube and not from an open container. In such a case there would be no opportunity for a loss of volatile preservative.

As it stands at present, it would seem that the proper evaluation of tragacanth cannot be made until the question of what might be called abnormal swelling in certain specimens has been satisfactorily answered. Likewise, neither would it be possible to expect any marked uniformity in tragacanth gels such as is basically represented by the N. F. Ephedrine Jelly, until the evaluation of tragacanth itself has been properly determined.

CONCLUSIONS.

Certain tragacanths which appear of poor quality as tested by the falling ball-gel method, show an increased value over so-called good tragacanth when their gels are allowed to age. This may be due to a dehydration of the tragacanth itself upon aging, with the resulting change in the nature of the gel prepared from it.

The Preservation of Jelly of Ephedrine Sulfate, N. F. VI, has been considered and the feeling is expressed that the present formula is probably satisfactory in that respect.

HYDROGENATED CASTOR OIL IN OINTMENTS—PART III. PRODUCT OF SULFONATION.*

BY GEORGE W. FIERO.[1]

Sulfonated oils have long been employed in industry as emulsifying agents and detergents. In cosmetics they have been included in cleansing creams for detergent action as well as to insure proper emulsification. In the manufacture of these oils, the sulfuric acid unites with the fatty acid molecule at the double bond to produce the "sulfonated" oil. Actually this is not sulfonation, but more correctly "sulfation" since the "—OSO_2OH" group is attached to the carbon chain.

In the case of hydrogenated castor oil, however, there are no double bonds which the sulfuric acid may attack, and the reaction is between the sulfuric acid and the "—OH" group on carbon atom 12 to produce the sulfate ("—OSO_2OH") at this point. Thus the product of "sulfonation" of hydrogenated castor oil differs from other "sulfonated" oils chemically. Physically it likewise differs in that it is solid while they are liquids.

"Sulfonated" hydrogenated castor oil[2] (hereafter abbreviated "SHCO") is a yellowish solid, practically insoluble in hot water, but soluble in alcohol and liquid petrolatum. The combining weight as determined by the acid value, was found to be 412 (theoretical 410). It readily combined with alkalies to produce salts

* Presented before the Section on Practical Pharmacy and Dispensing, A. PH. A., Minneapolis meeting, 1938.

[1] University of Buffalo, School of Pharmacy.

[2] Manufactured by National Oil Products Co., Harrison, N. J.

(*i. e.*, double sulfates). This is accomplished by adding a hot aqueous solution of the molecular equivalent of the alkali to the molten SHCO. The following salts were prepared:

1. *Sodium SHCO.*—A yellowish colored, hard solid, soluble in hot water yielding with four parts of water a white, soft, paste-like mass upon cooling; with 20 parts, a soft jelly resulted; with 40 parts, a thick liquid was produced. An 0.25% solution precipitated when cooled to room temperature. It is soluble in hot alcohol, crystallizing therefrom as a white solid. With liquid petrolatum, if heated sufficiently high to drive off the residual water, a 10% solution formed a hard gel upon cooling. A 1% solution produced a gel which "bled" oil on a hot day, while an 0.25% solution produced a soft gel.

2. *Potassium SHCO.*—Yellowish colored, hard solid, soluble and producing a gel in water and liquid petrolatum; soluble in alcohol.

3. *Ammonium SHCO.*—Yellowish colored, soft solid, soluble and producing a gel in water and liquid petrolatum; soluble in alcohol.

4. *Calcium SHCO.*—White solid, insoluble in water, practically insoluble in alcohol, forms cloudy solution with liquid petrolatum, but no gel forms when cooled.

5. *Triethanolamine SHCO.*—Yellowish colored, soft solid, soluble in water—more soluble than any of the above, the 1% solution having less precipitate; producing a gel in water; insoluble in liquid petrolatum; soluble in alcohol.

6. *Triisopropanolamine SHCO.*—Yellowish colored, semi-solid, soluble in water but not producing a gel. The solution with equal parts was semi-solid, with two parts a thick liquid, and with four parts quite liquid; soluble in alcohol and glycerin; insoluble in liquid petrolatum.

7. *"Mixed Isopropanolamine"* SHCO.*—Similar to triisopropanolamine SHCO.

Characteristics of Salts of SHCO.—The solutions of various salts of SHCO were tested in the same manner as the salts of triethanolamine previously reported (1), as indicated in the following table (all data were obtained at 45° C.):

TABLE I.

Salt.	Suds.	Surface Tension.
1% Aqueous Solutions.		
Sodium SHCO	130%	33.4
Potassium SHCO	65%	38.6
Ammonium SHCO	100%	35.5
Triethanolamine SHCO	80%	34.2
*"Mixed Isopropanolamine" SHCO	200%	36.8
Commercial Sulfonated Castor Oil	70%	37.5

* Carbide and Carbon Chemicals Corp. Approximately 14% mono-, 43% di- and 43% triisopropanolamine.

TABLE II.

Salt.	Suds.	Surface Tension.	p_H.
0.25% Aqueous Solutions.			
Sodium SHCO	250%	31.4	8.5
Potassium SHCO	35%	41.9	8.1
Ammonium SHCO	35%	36.9	8.7
Triethanolamine SHCO	60%	35.5	8.3
*"Mixed Isopropanolamine" SHCO	70%	34.2	8.1
Commercial Sulfonated Castor Oil	50%	39.6	7.3

* Carbide and Carbon Chemicals Corp. Approximately 14% mono-, 43% di- and 43% triisopropanolamine.

Emulsifying Agent.—Since the sodium salt of SHCO had the greatest foam capacity and least surface tension, it was employed in the following experiments. A series of emulsions were

prepared to determine the value of SHCO as an emulsifying agent as compared with commercial sulfonated castor oil. A 25% oil emulsion was employed since this "breaks" more readily than a 50% emulsion. With this emulsion there is often a separation of "cream" which, if no free oil separates, may readily be made homogeneous by shaking. The emulsions were prepared by dissolving the sodium SHCO in warm water (75 cc.) and added to the oil (25 cc.) and agitated with a fast mechanical mixed for 15 seconds. The results are indicated as follows:

TABLE III.

No. Gm. SHCO.	State of Emulsion. After 1 Hour.	After 3 Days.
5	100%	95% cream
2.5	90% cream	80% cream
1.25	70% cream	65% cream
0.67	55% cream	50% cream—trace oil

Similar emulsions prepared using commercial sulfonated castor oil in the same manner (10, 5, 2.5, 1.25 and 0.67 Gm.) all were "broken" as indicated by separation of oil.

Cosmetics.—In order to ascertain the value of SHCO as an emulsifying agent in cosmetics, creams were prepared with the following as a basic formula:

White Wax	15 Gm.
Liquid Petrolatum, Heavy	50 cc.
Distilled Water	30 cc.
Sodium SHCO, *q. s.*	

The cream was prepared by melting the wax, adding the liquid petrolatum and mixing this hot solution with the aqueous solution of SHCO heated to the same temperature. The mixture was agitated for a few seconds with a fast mechanical mixer and stirred by hand occasionally until cool. The results are indicated in the following table:

TABLE IV.

No. Gm. SHCO.	State of Emulsion.	After 6 Months.
2.500	Perfect	Perfect
1.870	Perfect	Perfect
1.250	Perfect	Perfect
0.670	Perfect	Perfect
0.250	Perfect	Perfect
0.125	Perfect	Perfect
0.067	Perfect	Perfect
0.033	Perfect	Perfect
0.016	Good	Good
0.008	Fair*	Fair
0.004	Fair*	Fair
0.002	Fair*	Fair

* These samples separated slightly while hot and required a few seconds agitation with mechanical mixer when cooled to just above the congealing point.

Creams were prepared in the same manner with commercial sulfonated castor oil. Those containing 2.5 and 1.25 Gm. of sulfonated castor oil separated slightly; samples with smaller quantities were unsatisfactory. After six months these samples had a faint rancid odor while those with SHCO had a faint, but not disagreeable odor. After standing ten months, the creams were placed in an oven at 80° C. for a period of 24 hours. Upon examination it was found that in those containing 0.67–2.50% of SHCO the emulsion was still unbroken; those with less emulsifying agent were broken. In creams containing as much as 10% of commercial sulfonated castor oil, the emulsion was broken.

Vanishing creams were prepared according to the following basic formula:

Stearic Acid	15 Gm.
Distilled Water	60 cc.
Sodium SHCO, *q. s.*	

The SHCO was dissolved in hot water, added to the molten stearic acid and agitated with a mechanical mixer. Prepared with 2.5 Gm. SHCO, the emulsion and consistency were quite satisfactory; with 1.25 Gm. SHCO, the emulsion was satisfactory, but the consistency too soft; with 0.67 Gm. a thick liquid resulted with separation of "cream" but the emulsion was not broken.

Vanishing creams were prepared in the same manner using commercial sulfonated castor oil. The sample containing 2.5 Gm. "creamed" readily and required more agitation than SHCO; this is undesirable in a vanishing cream as it tends to include too much air. Even though the sample was stirred constantly by hand until congealing point, the emulsification was not satisfactory and the cream was very soft. Samples with smaller amounts of sulfonated castor oil did not produce good emulsions.

Detergency.—In order to determine the relative detergent properties of various salts of SHCO, artificially soiled cloth was washed with 1% aqueous solutions of the salts. White cotton cloth, 6 x 9 inches was soiled with artificial soil mixture, dried at 80 degrees C. for 1 hour, aged over night, ironed with a low-heat iron and the extent of soil determined by means of reflection of light from the cloth to a photoelectric cell.[1] Two samples were washed 10 minutes in 200 cc. of the solution at 45 degrees C., rinsed three times with distilled water, dried on blotter, then in oven at 80 degrees for 1 hour and finally in the air for 30 minutes. The cloth was then ironed with a medium-hot iron and the extent of soil again determined. The extent of soil is expressed in per cent of brightness; the reflection obtained by a black photographic plate-cover representing 0% and that obtained by the original cloth representing 100%.

The cloth was soiled with soil solution composed of:

Lamp Black	2 Gm.
Liquid Petrolatum, Heavy	5 Gm.
Tallow	3 Gm.
Carbon Tetrachloride	2000 cc.

Four readings were made on each sample and four samples were washed with each salt. The average of the four samples is reported in the table below:

TABLE V.

Salt of SHCO.	Original Soil.	First Wash.	Soil Removed.	Second Wash.	Soil Removed.
"Mixed Isopropanolamines"	59.6%	76.7%	17.1%	85.5%	25.9%
Triethanolamine	59.8%	80.6%	20.8%	87.0%	27.2%
Ammonium	59.8%	78.9%	19.1%	86.7%	26.9%
Potassium	60.9%	81.5%	20.6%	85.6%	24.7%
Sodium	60.7%	85.8%	25.1%	90.8%	30.1%
Commercial Sulfonated Oil	60.6%	81.5%	20.9%	86.2%	25.6%

SUMMARY.

1. Salts of "sulfonated" hydrogenated castor oil were prepared with the following bases: calcium, sodium, potassium, ammonium, triethanolamine, triisopropanolamine and "mixed isopropanolamines." Their solubilities in water, alcohol and petrolatum and the surface tension, p_H, and "foam ability" of their aqueous solutions are reported. A gel with liquid petrolatum was produced with salts of sodium, potassium and ammonium. The sodium salt was the most satisfactory

[1] For details of apparatus and method of washing, see "Salts of Triethanolamine.—Part II. Detergency," presented to the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

from the standpoint of surface tension and "foam ability." Salts with tri-isopropanolamine and "mixed isopropanolamines" were semi-solid; all others were solid.

2. "Sulfonated" hydrogenated castor oil was superior to commercial "sulfonated" castor oil as an emulsifying agent. A good 25% oil emulsion was produced with 1.25% of the former while an emulsion with 10% of the latter "broke."

3. "Sulfonated" hydrogenated castor oil was likewise superior to commercial "sulfonated" castor oil for production of cosmetics. A stable cold cream was readily prepared with 0.035% of "sulfonated" hydrogenated castor oil as the sole emulsifying agent. Cold cream prepared with 0.0025% was stable, but required considerable agitation while cooling. Likewise "sulfonated" hydrogenated castor oil was found satisfactory as an emulsifying agent for vanishing creams.

4. Salts of "sulfonated" hydrogenated castor oil were found to be good detergents as compared to "sulfonated" castor oil. The sodium salt was most satisfactory.

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THE ABILITY AND OPPORTUNITY OF THE PHARMACIST TO SERVE ALL HOSPITALS, LARGE OR SMALL.*

BY MARY DIENHART.[1]

Hospital pharmacy is becoming an important phase of the pharmaceutical profession. For many years, the larger hospitals have employed one or more full-time pharmacists and they have found it advisable to do so not only to insure the confidence of the physicians on their staff but also that of the patients, and for economic reasons. Due to the size of the hospital and the number of patients under constant care, the services of the pharmacist are necessary to fill the medicinal needs of the patients.

The duties of the pharmacist in any hospital are innumerable but in a large hospital they are carried out on a larger scale and consequently require more of the pharmacist's time. Among these duties may be listed:

1. The preparation of stock materials and the proper storage of them—many preparations may be made by the pharmacist more economically than they can be purchased from the pharmaceutical houses because hospitals have access to tax-free alcohol.
2. The dispensing of narcotic drugs and a perpetual inventory of them.
3. The dispensing of all standard and official preparations as well as the specialties of the manufacturing houses.
4. The preparation and sterilization of parenteral solutions.
5. The sterilization and care of all surgical and parenteral supplies.
6. The purchase of all drugs, chemicals and biologicals and the proper storage of them.

Briefly, the hospital pharmacy should be a department of every hospital in which drugs and medical supplies are purchased, stored and dispensed and in which necessary records are kept.

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* Presented before the Sub-Section on Hospital Pharmacy, A. PH. A., Minneapolis Meeting, 1938.

[1] Pharmacist, Rockford Hospital, Rockford, Ill.

Smaller hospitals have found it rather difficult to solve their pharmaceutical problem. The duties in the pharmacy itself are not enough to warrant the full-time employment of a registered pharmacist but, at the same time, they feel it advisable to have a pharmacist present at all times so that prompt service may be given. Probably because of economic reasons, they feel that they cannot possibly employ a pharmacist and consequently are forced to purchase their drugs from a nearby prescription shop and perhaps also require the part-time services of a nearby pharmacist. This in itself is hardly economical and hardly renders the prompt service which the physician especially desires for his hospital patients.

This is one reason the higher educational requirements now in effect in Pharmacy are important. The graduate of an accredited college of Pharmacy is not only prepared to serve in his own profession but has the ability to serve in other related professions as well. A registered pharmacist must be a graduate of a four year course in Pharmacy and must have had one or more years of experience.

This four-year course includes the routine academic subjects required of every college graduate besides the subjects in the School of Pharmacy itself and elective courses. This prepares the student of Pharmacy both socially and professionally.

One of the major subjects now included in the pharmaceutical curriculum is Bacteriology. The pharmacy student studies this course almost as extensively as the science student and, by so doing, he is prepared to serve as a laboratory technician. Neither student has had the experience to qualify as a hospital laboratory technician but either student would be capable of doing this work after a little experience was acquired. Blood and urine analyses, section staining, lab chemistry, etc., are studied by the pharmacy student and this phase of Bacteriology is important in the hospital laboratory.

In many universities, radiography is now being offered as an elective course and as the demand for it increases so also will the course. Of necessity, the course has been only a short one and gives the student only a basic knowledge of the subject but there are possibilities of increasing this knowledge by actual experience in an X-ray department. The equipment used, the technique employed, and the positioning of the patient for the X-ray are the primary factors learned while studying the course as it is offered, but the actual experience of handling injured patients must be acquired later. As time goes on, this may be accomplished by the student while he is still attending college but at the present time he must obtain this experience after graduating. This is true of any profession, however, and here again the pharmacist may serve the hospital in another capacity.

The one or two years of actual experience in the drug store required of a pharmacist before he may become registered also prepares him to serve in still another department of the hospital and this is the purchasing department. Hospital supplies, surgical supplies and physicians' office supplies are handled in drug stores and the pharmacist becomes familiar with the purchase of these supplies as well as the purchase of drugs. This experience in the drug store would enable the pharmacist to serve as purchasing agent in the hospital.

In hospitals where training schools are maintained, the pharmacist could teach the courses in Materia Medica. This would relieve a physician of the staff of this task and at the same time still assure thorough teaching of the subject because the pharmacist is capable and can be educated to do this.

This should help solve the problem of the small hospital as far as Pharmacy is concerned. Not every pharmacist has had the training to do all these things but it is possible for the student to plan his college curriculum to include these subjects and thus prepare himself to serve as a hospital pharmacist. If the full-time services of a pharmacist are not required, then the pharmacist could substitute in one of the other departments aforementioned. In several instances, it may be found that a technician is needed to relieve in the laboratory or X-ray departments. The pharmacist could do this relief work and thus do away with the necessity of employing a part-time technician, a part-time pharmacist and the purchase of drugs from a nearby drug store. This would be far more economical and far more satisfactory to the staff as well as to the patient.

Every hospital, large or small, should have the services of a pharmacist at its disposal and it is possible to do so. The pharmacist has the ability to serve all hospitals and the hospital should offer the opportunity. Society now demands good medical care and it should be entitled to efficient pharmacy service as well. If the hospital expects to hold the confidence of the patient, the physician and the staff in general, efficient service must be given and this service should consist of pharmaceutical as well as nursing service.

Pharmacy is now recognized as a medical specialty and shares the responsibility of the various divisions of medical practice. The services of the physician are necessary to the patient of the hospital and likewise the services of the pharmacist are required to prepare the medication prescribed. Medicine and Pharmacy are sister professions. The physician, the pharmacist and the hospital should keep them as such, the physician by insisting that the hospital employ a pharmacist to fulfil the medicinal needs of the patient; the pharmacist by preparing himself to serve all hospitals; and the hospital by endeavoring to safeguard the prescribing, dispensing and administering of the care and medications needed to preserve the welfare and health of humanity. The medical, pharmaceutical and nursing professions must all be well represented in order that the hospital may accomplish this feat.

THE THERAPEUTICS COMMITTEE OF A HOSPITAL.*

BY BERNARD FANTUS.[1]

Correct technique means employing the best method to secure a certain result. Its study is the proper subject of technology; and medical technology should include the determination of how to obtain, under certain conditions, the best results from treatment so far as efficiency, expediency, pleasantness and economy are concerned.

As long as physicians fought disease single-handed and under the unfavorable conditions of the "horse and buggy doctor," they made use of whatever means they had to achieve their purpose and the ability to improvise for emergencies was their great accomplishment.

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* Presented before the Sub-Section on Hospital Pharmacy, A. PH. A., Minneapolis Meeting 1938.

[1] Director of Therapeutics, Cook County Hospital; Professor of Therapeutics, University of Illinois, College of Medicine, Chicago, Ill.

Times have changed. The crossroads doctor is rapidly disappearing. Doctors now practice in groups, whether associated with each other officially or unofficially referring patients to each other; and the hospital is becoming the center of medical practice. More and more people resort to hospitals for the restoration of their health because they get better service there.

Correct technique in hospitals is of as much greater importance as contrasted with the need for it by the crossroads doctor as is correct technique in a shoe factory contrasted with the need for it by the cobbler. To develop correct hospital technique obviously requires the coöperation of the doctor, the nurse and the pharmacist. These three must work together harmoniously and efficiently; and to accomplish this harmonious coöperation demands the establishment of a committee in any hospital too large for these officers of the institution to eat many meals together.

ORGANIZATION OF THE COMMITTEE.

It seems so obvious that physician, hospital pharmacist and nurse should meet periodically to discuss the problems they are mutually interested in that no argument should be required to show the necessity for the establishment of therapeutics committees in all the larger hospitals. The problem is how to organize such a committee. That the chief pharmacist and the director of the nursing service are eager for service on such a committee there is no doubt. The problem is to find doctors who are sufficiently competent and interested in the matter to function as members of a therapeutics committee. Most doctors of experience have acquired certain techniques that they have learned produce results and they are loath to change these methods. They are still more loath to discuss them in or with such committee for fear of displaying their ignorance too prominently. If available, a physician who is also a pharmacist, is obviously the most desirable leader of such a group. If no such a one is available the chief of the medical staff should be drafted for this service. To these three as the nucleus of the therapeutics committee I would add the hospital superintendent as an essential fourth. At no other time and in no other way can the superintendent of a hospital become so intimately acquainted with some of the problems arising in the hospital as during these meetings; and in no better way can he arrive at an understanding of the reasons for any rules that might result from these conferences and that it may become his duty to enforce. The hospital dietician and the head or heads of the physical therapy departments are also necessary members of the therapeutics committee: for therapeutics means the art and science of the application of *all* known remedies in the treatment of disease. All other members of the medical staff should be welcome at these meetings. In most instances probably monthly meetings of the committee will suffice.

THE FUNCTION OF THE COMMITTEE.

The pharmacist, it seems, might lead off with a report on the consumption of drugs and supplies during the month just past, acquaint the committee with changes in the drug market and with any other item of development in Pharmacy that it might be well for the committee to be made acquainted with. It is at this time that the pharmacist may advance suggestions for improvement of the service and have these discussed, voted upon and made official by recommendation to the hospital medical staff or the Board of Directors if these suggestions are adopted

by the committee. The chief nurse then might make her report and discuss successes as well as failures in the application of the remedies employed in the hospital as these matters have come to her notice. Patients' complaints about the quality, taste or effect of drugs may here be openly discussed and conclusions, possibly for the necessity of an investigation, be arrived at. The heads of the other departments may then make similar reports. The hospital superintendent and the chief of staff may then bring up matters that they may desire the therapeutics committee to act upon. In the natural course of events committees will be appointed, which will make their reports at these meetings.

It is desirable that the specific items to be discussed as well as the report of the previous meeting be in the hands of each member some time before the committee convenes so that the members have the opportunity to gather information on some of the questions to be acted upon.

It should be understood that the therapeutics committee is an advisory committee of the medical staff or of the Board of Directors, as the case may be, and that it reports to such committee its recommendations for final discussion and adoption, whereupon such recommendation becomes a rule of the hospital.

THE COOK COUNTY HOSPITAL THERAPEUTICS COMMITTEE.

The actual work of such a committee might possibly be best illustrated by the example of a committee I am familiar with. One of the first acts of this committee was the promulgation of the following rules:

Therapy of the Cook County Hospital. Bulletin "B," August 10, 1938.

COOK COUNTY HOSPITAL.

"MATERIA MEDICA."

1. The Cook County Hospital Materia Medica should consist, so far as possible, of official drugs and preparations only, *i. e.*, those recognized in the U. S. P. and N. F.

2. Other drugs or preparations may be admitted if they are absolutely required and if they are recognized by "New and Non-Official Remedies."

3. New preparations not yet accepted by "New and Non-Official Remedies" but that might be acceptable to the Council on Pharmacy and Chemistry, may after careful scrutiny be possibly admitted to the Cook County Hospital Materia Medica.

4. Proprietary preparations not coming under these three classes and secret products are not acceptable to the Cook County Hospital Materia Medica.

5. Whenever therapeutically equivalent preparations have a significant price difference, the less expensive one is to be selected.

BERNARD FANTUS, *Director of Therapeutics.*

The following "Bulletins," issued from time to time by the Therapeutics Committee of the Cook County Hospital, may serve to illustrate somewhat the scope of its work.

Cook County Hospital Analgesic Medication Standards. April, 1937

In a fairly well controlled study in the Head Cancer Clinic, acetylsalicylic acid scored first place as analgesic when compared with a number of others, and it is therefore recommended as the base of analgesic compounds, unless the patient is an allergic or an asthmatic individual. Then acetophenetidin may be preferred.

Acetylsalicylic Acid, 0.3 Gm. tablets. One every hour as required until relieved or until excessive sweating or ringing in the ears or other untoward effect, is noted; then every 2 to 4 hours as required.

Acetylsalicylic acid, 0.3 Gm. and *Hyoscyamus Extract, 0.01 Gm.* capsules. To be used when excessive perspiration develops with use of acetylsalicylic acid.

Acetylsalicylic acid, 0.3 Gm., Phenobarbital, 0.03 Gm., and *Hyoscyamus Extract, 0.01 Gm.* capsules. These may be preferred if the pain interferes with sleep, but may also be found effective when the simple tablets fail to give relief.

Opium 0.03 Gm. tablets. One every two to four hours as required for severe pain. May be used in addition to any one of the above tablets. Harrison Law requirements must be met.

Morphine sulfate for hypodermic injection.

0.65 cc. = 0.01 Gm. (for women)
1.00 cc. = 0.015 Gm. (for men).

May be repeated once in 2 hours, then every 4 hours. Harrison Law requirements must be met.

Atropine sulfate for hypodermic injection.

0.5 cc. = $^1/_2$ mg. (gr. $^1/_{120}$).

Useful addition to morphine when antispasmodic action is desired.

Scopolamine hydrobromide for hypodermic injection.

1 cc. = $^6/_{10}$ mg. (gr. $^1/_{100}$).

Useful addition to morphine when motor depression is desired.

Note: Codeine is a very inferior analgesic as compared with morphine or opium and relatively much more expensive.

Therapy of the Cook County Hospital. Bulletin "C," August 9, 1938.

COUGH MEDICATION STANDARDS.

1. *Ammonium Chloride Syrup,* containing 0.30 Gm. per 5 cc. of Syrup of Glycyrrhiza. Dose: 1 teaspoonful in a *cupful** of water every two hours (to increase and fluidify bronchial secretion).

2. *Ipecac and Belladonna Syrup,* containing Syrup of Ipecac, 0.5 cc. and Tincture of Belladonna 0.10 cc. per 5 cc. of Syrup of Cherry. Dose: Teaspoonful in *cupful** of water every 2 hours.

3. *Apomorphine Syrup,*** containing Apomorphine hydrochloride, 3 mg. ($^1/_{20}$ gr.) per 5 cc. of Syrup of Citric Acid. Dose: 1 teaspoonful in *cupful** of water every two hours.

4. *Potassium Iodide Syrup,* containing 0.10 Gm. per 5 cc. of Syrup of Orange. Dose: 1 teaspoonful in a *cupful** of water every two hours.

5. *Elixir of Terpin Hydrate, N. F. VI,* containing 0.07 Gm. per 5 cc. of elixir. Dose: 1 teaspoonful in water every 4 hours.

6. *Bromide Cough Syrup,* containing 0.30 Gm. per 5 cc. of Syrup of Glycyrrhiza. Dose: 1 teaspoonful in water as required for excessive cough.

Codeine** or other narcotic must be especially prescribed if it is desired to be given in cough medication. Solution of 0.03 Gm. per teaspoonful is supplied to the wards. *The less codeine the better for most patients.*

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* *Nurse please note: When fluidification of bronchial mucus is desired, the cupful of water may be quite as important as the medicine.*

** *Such prescriptions must meet the requirements of the Harrison Narcotic Law.*

Mr. J. W. Gayle recently retired as secretary of the Kentucky Board of Pharmacy after something more than forty-one years of service in that position. Mr. Gayle will have completed fifty years of service as secretary of the Kentucky Pharmaceutical Association at the coming meeting in June, when he will also retire from that position. This record of service in two positions of such importance is unique.

Mr. Gayle became a member of the A. PH. A. in 1892 and has been a life member since 1927. He has been closely associated with the National Association Boards of Pharmacy since it was organized and has served as its treasurer since 1920.

THE INFLUENCE OF WORKING AND STUDY HOURS UPON GRADES IN A PHARMACY SCHOOL.*

BY L. K. DARBAKER.[1]

For some years the writer has thought that the number of hours the student worked in a pharmacy influenced the grades of that student and that the more hours the student worked the higher the grades. This study was undertaken to determine if this was true. A tabulation of the four classes as to grades, working hours and available study hours is given in Table I.

TABLE I.

Grades as Percentages.

	65–69.	70–74.	75–79.	80–84.	85–89.	90–94.	95–100.
Freshmen		1	10	45	60	15	8
Sophomores	1	5	30	34	58	22	4
Juniors		7	54	60	60	15	6
Seniors		6	34	84	90	14	10
Total	1	19	128	223	268	66	28

Average Working Hours.

	0.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.	65.
Freshmen	4	1	3	1	0	8	13	7	7	3	2	0
Sophomores	6	0	4	2	1	3	5	4	3	0	1	1
Juniors	2	2	1	0	1	3	6	6	7	5	6	2
Seniors	3	0	0	1	1	2	6	7	14	3	9	0
Total	15	3	8	4	3	16	30	24	31	11	18	3

Available Study Hours.

	5.	6.	7.	8.	9.	10.	11.	12.	15.	20.	25.	30.	35.	40.
Freshmen	0	4	4	3	1	12	0	0	8	4	6	0	0	0
Sophomores	2	0	1	0	0	2	1	4	8	7	1	10	0	1
Juniors	6	3	5	1	2	9	0	0	8	4	2	0	0	0
Seniors	18	5	4	3	5	5	0	0	2	2	1	1	0	1
Total	26	12	14	7	8	28	1	4	26	17	10	11	0	2

Pharmacognosy was chosen as the subject for further investigation as this subject consists of both lecture and laboratory. Table II shows the grades in percentages and the working hours per week with the hours available for study. Table III summarizes these results.

TABLE II.—AVERAGES IN PHARMACOGNOSY (JUNIOR CLASS).

	0.	14–19.	20–25.	26–30.	31–35.	36–40.	41–45.	46–50.	51–55.	56–60.	61–65.	66.
Working hours	2	2	1	1	1	6	4	8	5	9	3	1
Average hours available for study	13	23	16	7	18	12	22	11	9	6	7	11
Grades	82%	91%	86%	96%	86%	88%	87%	85%	84%	81%	84%	91%

* Presented before the Section on Education and Legislation, A. PH. A., Minneapolis Meeting, 1938.

[1] Professor of Histological Pharmacognosy and Bacteriology, School of Pharmacy, University of Pittsburgh.

TABLE III.—AVERAGES IN PHARMACOGNOSY FOR SCHOOL YEAR.

Grade.	Hours Worked Per Week.	Hours Per Week Available for Study.
72	58	3
74	44	18
75	47	5
76	58	3
77	48	9
77	48	21
80	0	28
78	59	14
80	65	2
81	52	11
81	58	3
81	59	11
81	60	3
81	62	7
82	50	5
82	60	6
83	56	4
84	0	15
84	52	14
84	40	10
85	50	13
85	38	9
86	23	16
86	35	18
86	37	6
87	43	32
87	51	6
87	60	7
89	38	16
89	38	16
90	14	15
90	46	5
91	19	10
91	66	11
92	42	16
92	49	7
93	40	14
93	53	7
94	41	19
95	48	16
96	30	7

From these tabulations it would seem that the student working the most hours had the best grades, unless the student was an exceptional type, and that the average student not working had in many cases the lower grades. As the students were individually interviewed after each examination (every six weeks) various additional information was obtained. It was interesting to note the occupations of the fathers. Table IV shows that thirty-six of the students had fathers who were pharmacists and that (other than fathers) the students had forty-two relatives who were pharmacists.

TABLE IV, —OCCUPATION OF FATHERS.

	Freshmen.	Sophomores.	Juniors.	Seniors.	Total
Pharmacist	11	7	6	12	36
Laborer	1	5	9	4	19
Mechanic	3	1	1	4	9
Merchant	0	4	1	11	16
Clerk	1	3	4	0	8
Foreman	3	0	3	2	8
Salesman	4	2	1	0	7
Carpenter	0	1	3	2	6
Engineer	2	0	3	1	6
Contractor	0	1	3	1	5
Farmer	0	2	0	2	4
Junk dealer	1	2	1	0	4
Glassworker	2	0	1	0	3
Grocer	3	0	0	0	3
Railroader	1	0	2	0	3
Butcher	2	0	0	0	2
Minister	1	0	0	1	2
Priest	0	0	1	1	2
Painter	0	1	1	0	2
Accountant	0	1	0	0	1
Bricklayer	0	1	0	0	1
Chemist	1	0	0	0	1
China decorator	1	0	0	0	1
Cigar manufacturer	0	0	0	1	1
Dairyman	1	0	0	0	1
Insurance agent	0	0	1	0	1
Foundryman	0	1	0	0	1
Landlord	0	0	0	1	1
Rancher	1	0	0	0	1
Realtor	0	0	0	1	1
Shoe repairman	1	0	0	0	1
Steel worker	0	0	0	1	1
Tinner	0	0	1	0	1
Traffic manager	0	0	0	1	1
Truck driver	1	0	0	0	1
Relatives in the Drug Business.					
Brothers	1	1	3	10	15
Sisters	1	0	0	2	3
Cousins	2	0	2	2	6
Uncles	3	3	2	2	10
Sisters-in-law	0	1	1	1	3
Brothers-in-law	1	1	2	1	5

RECENT NATIONAL LEGISLATION AFFECTING PROFESSIONAL PHARMACY.*

BY E. F. KELLY.[1]

It is probably true that a greater number of measures and measures of greater direct importance to professional Pharmacy were introduced, amended and enacted and later made effective by Presidential approval, during the three sessions of the Seventy-Fifth Congress than in any preceding Congress of the United States. In addition, the laws enacted have led, or will lead, to regulations for their enforcement and to court decisions for their interpretation, which are or will be of much more than usual importance to our profession.

In fact, the full effect of the legislation will not be known until the regulations and the court decisions are available, and until experience in their enforcement is gained. However, the basic provisions of the legislation are so definite in most instances and so comprehensive in character, that the laws will probably exert a much more powerful influence, even though they may be amended, than is generally understood and in all probability, than was understood even by many who had a part in their drafting and enactment.

The length and purpose of this paper will permit only an enumeration and a brief review of these laws. They should, however, have the careful and prolonged study of those who are interested in the future of the profession of Pharmacy and it is hoped that their assembly in this form will impress every one interested, with their scope and importance.

Marihuana Taxing Law.—This measure was intended to practically outlaw a formerly important drug and its preparations through the taxing power of the Federal government rather than to directly forbid its importation or production as was done in the case of heroin, because the fiber, the oil and the seed of this drug have a large commercial use. The imposition of a tax on all transfers of the drug or its preparations, as well as the tax on the drug itself, is a new principle in narcotic legislation as is the requirement that the official order forms for its purchase cannot be obtained in advance. In the first draft, it was required that the applicant for the forms must appear in person at the office of the Collector of Internal Revenue when the forms are required but it was later provided that the forms could also be secured by mail when required.

The Source of and Tax on Distilled Spirits Including Alcohol.—In the so-called Sugar Act of 1937, an effort was made to impose a tax on liquid sugars only when used in the distillation of alcohol and this was opposed on the ground that it would increase the cost of drugs and medicines and was an attempt to limit the source of a necessary chemical substance.

In the 1938 Tax Bill, a floor tax of 25 cents per proof gallon was imposed on distilled spirits including alcohol. An exemption was granted on distilled spirits when employed for non-beverage purposes which amounts to a savings of approximately 47 cents per wine gallon of alcohol.

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* Presented before Section on Education and Legislation, A. PH. A., Minneapolis meeting, 1938.

[1] Secretary, A. PH. A., Washington, D. C.

In the consideration of the Food, Drug and Cosmetic Bill in the House another attempt was made to limit the source of distilled spirits to cereal grains, which was defeated.

Distilled spirits, and especially alcohol, are so necessary in Pharmacy that every effort should be made to secure a clear distinction between their use for beverage purposes as against their use for non-beverage or industrial purposes, and to prevent any limitations on their source except so far as that is necessary, provided their identity, strength and purity can be protected.

Venereal Disease Control Act.—Under this measure, $15,000,000 was appropriated over a period of three years, "For the purpose of assisting states, counties, health districts and other political subdivisions of the states in establishing and maintaining adequate measures for the prevention, treatment and control of venereal diseases." A plan is here provided for coöperation between the national and the state governments for the control of a class of diseases, which offers the pattern for the similar control of other diseases and the extension of medical services under governmental control.

Fair Labor Standards Act.—Professional services are given a clear exemption under the first Federal legislation to directly control minimum wages and maximum hours of employment, which in all probability will become the pattern for state legislation. This exemption should be carefully guarded and protected by the maintenance of a fair schedule of wages and hours in Pharmacy.

Federal Trade Commission Act.—In this measure the basic act establishing the Commission was amended (1) to broaden the powers of the Commission over unfair methods of competition by giving it jurisdiction over all unfair or deceptive acts or practices in commerce whether competitive or not, and (2) to give the Commission more effective control over the false advertising of foods, drugs, devices and cosmetics. The definitions of these latter articles are similar to those in the Federal Food, Drug and Cosmetic Act, referred to below, and are very comprehensive. The false advertisment of any of them for the purposes of the act "means an advertisment, other than labeling, which is misleading in a material respect; and in determining whether any advertisment is misleading, there shall be taken into account (among other things) not only representations made or suggested by statement, word, design, device, sound or any combination thereof, but also the extent to which the advertisment fails to reveal facts material in the light of such representations or material with respect to consequences which may result from the use of the commodities to which the advertisment relates." It should be noted that the advertisement is false if misleading in a material respect and that for the first time, failure to reveal material facts is recognized as constituting false advertising.

It will be seen that the Commission is given very broad powers of control and in addition provision is made for its cease and desist orders to become final in a given time and under certain conditions of appeal and decision. This measure may be said to materially extend and supplement the measure next discussed and it is fortunate that so far as advertising is concerned their definitions are similar and that they do not overlap.

Federal Food, Drug and Cosmetic Act.—This measure materially extends the provisions, prohibited acts and penalties of the former Food and Drugs Act of

1906. It also brings cosmetics and devices under its provisions and the advertising of foods, drugs, devices and cosmetics so far as labeling is concerned, and prohibits the introduction or the delivery for introduction into interstate commerce of a new drug except under the conditions specified which are intended to protect the public against dangerous drugs. As stated above, the definitions of food, drugs, devices and cosmetics are very comprehensive and parallel those in the Federal Trade Commission Act. For the purposes of the Act, labeling is defined as "all labels and other printed, written or graphic matter (1) upon any article or any of its containers or wrappers, or (2) accompanying such article." False advertising of these products so far as the labeling is concerned, is covered by the requirement that the labeling shall not be false or misleading in any particular. In determining whether an advertisment on the labeling is misleading, the same requirements apply as were set up for false advertisments other than on the labeling and which were quoted above.

The provisions covering the adulteration or misbranding of drugs and devices are greatly extended and for the first time, prescriptions are exempted from certain of the misbranding provisions specifically. The labeling provisions should be studied carefully as they will apply to retail pharmacies if the states adopt similar provisions.

Sections 201 and 505 relating to new drugs and Section 702 relating to samples became effective upon approval of the Act on June 25, 1938 and the other sections become effective one year afterward. Regulations under the sections now effective were issued on July 22, 1938 and regulations under the other sections will be issued as soon as practicable. The four reasons why a drug may be a new drug are very important since they may bring within the terms of the Act many articles now considered as old drugs because of newness of use, newness of combination, newness of proportions, newness of dosage, newness of methods of application or duration of administration or newness of other conditions of use that are otherwise different.

Regulations under the Harrison Act.—A recent act of Congress requires the codification of all regulations under Federal Acts, and in complying it was thought advisable to completely revise the regulations governing the importers, manufacturers, wholesalers and retailers licensed under the Harrison Narcotic Act and copies of the revised regulations will be made available by the Bureau of Narcotics to the Deputy Collectors of Internal Revenue during the month of August for distribution to every registrant. It is understood that no changes of consequence to pharmacists have been made in this revision of the regulations, but the codification of other regulations may be of importance.

This enumeration and very sketchy review of the legislation given consideration during the Seventy-fifth Congress may serve the purpose of indicating that the profession of Pharmacy is very directly affected by the legislation and that its responsibilities are greatly increased by reasons of its provisions. In the same measure, its opportunities as a profession are increased and furthermore its services are more likely to be valued at their true value by the American people.

THE HISTORY OF CALAMINE.*

BY HELEN L. CREECH[1] AND C. O. LEE.[2]

It seems that cadmia or cadmea was the precursor to our word calamine. While the origin of the word cadmia is rather vague, various authorities have given us their ideas about it. One suggestion is that it got its name from Cadmus who first taught the Greeks to use it (1). Agricola said the term was derived from calamus, meaning a reed, because of the slender stalactite form common with furnace calamine. Still another belief is that the word was derived from the Hindu calæm, which is in turn related to the Arabic term climia or calimia (2).

The belief that our modern word calamine is a corruption of the term cadmia has been quite generally accepted. It is interesting to note that as late as 1661 the term cadmia appeared in the books on medicine (3).

Recent archæological evidence seems to indicate that the Romans first used brass about the beginning of the Christian era. Pliny and Dioscorides published their works in the latter part of the first century A. D. and included monographs on cadmia. Pliny classes several products under the term cadmia. They are, zinc carbonate, zinc silicate and zinc oxide, the latter being obtained from brass furnaces. He also speaks of the use of calamine in the production of brass and states that it was used in medicine as a powerful healing and drying agent (4). The statements of Dioscorides concerning calamine are very similar to those of Pliny. Galen states that calamine from the island of Cyprus had superior therapeutic value.

For many centuries following the time of Dioscorides, Pliny and Galen information concerning calamine was very meager. However, the fact that calamine was used in the production of brass in the low countries, from about 300 A. D., remains clear.

Albertus Magnus (1206–1280) is credited with being the first to attempt to separate the zinc salts classed as calamine. He distinguished between tutia and lapis calaminaris stating that the former was an artificial product and the latter a mineral.

ZINC A NEW TERM.

There are fourteenth and fifteenth century records which indicate India and China knew about calamine and used it in the production of brass. It is said that China has an abundance of natural calamine.

The word zinc was first used by Paracelsus about 1500. During the seventeenth century zinc was found to be the metal of calamine. There seems to be some question as to who did this work. It is seemingly attributed to Wilhelm Homberg, Basil Valentine or J. H. Henckel. Marggraf and others demonstrated that calamine could be reduced to the metal and distilled in closed vessels in the absence of copper (2). In his Berlin memoirs Marggraf published one of the earliest accounts of an

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* Presented before the Section on Historical Pharmacy, A. PH. A., Minneapolis meeting, 1938.

[1] National Formulary Fellow, of the AMERICAN PHARMACEUTICAL ASSOCIATION, Purdue University School of Pharmacy.

[2] Professor of Pharmacy, Purdue University.

analysis of calamine. He found several samples of it to contain from $^{2}/_{16}$ to $^{9}/_{16}$ their weight of zinc.

LAPIS CALAMINARIS.

The Dispensatories and Pharmacopœias of the seventeenth and eighteenth centuries contain interesting monographs on calamine. These were very similar to those of Pliny and Dioscorides, the term cadmia being used as late as 1661 (3).

During the last quarter of the seventeenth century the term lapis calaminaris was frequently applied to the mineral. It was prepared by heating, followed by quenching with Plantone and Rose Water and finally levigating it. Calamine, at that time, was believed to be efficacious in healing ulcers and for running and rheumatic eyes.

The name lapis calaminaris was retained throughout the eighteenth century. The greatest use of the roasted mineral was that of the making of brass. However, it continued to be used in medicine. In the early part of this century Daniel Turner, a London surgeon, invented the famous Ceratum de Lapide Calaminari (5). This preparation has survived, considerably modified perhaps, for two centuries. Turner's cerate is a synonym for Unguentum Calaminæ N. F. VI. Turner believed in the merits of his preparation, and in offering it to the world he felt that he had given medicine a precious gift.

SMITHSONITE.

In 1803 James Smithson (6) analyzed four samples of calamine and for the first time distinguished chemically the difference between the silicate and carbonate of zinc. This aroused much interest as to the naming of calamine. A. Bronginart in France in 1807 gave the name calamine to the silicate. He called the carbonate zinc carbonatée. In 1832 F. S. Beudant applied the term smithsonite, in honor of James Smithson, to zinc carbonate and restricted the name calamine to zinc silicate.

In England, in 1852, Brooke and Miller proposed that these synonyms be reversed. At about the same time Kenngott proposed the term hemimorphite for the silicate of zinc. This all led to confusion in terminology. It should be stated, perhaps, that zinc carbonate is commonly called calamine or zinc spar by the British, and smithsonite by the Americans. Silicate of zinc is commonly called hemimorphite or electric calamine by the British and calamine by the Americans.

ANALYSES OF CALAMINES.

A great deal of interest was shown in the analysis of commercial calamines during the nineteenth century. The analyses of both the British and American workers from about 1837–1866 showed that the product which was sold for zinc carbonate was in reality barium sulfate colored with iron oxide. Davis (7) analyzed some English calamines and believed that the samples had improved in quality but other workers could not confirm his claims.

In view of the fact that the native calamines had been found to be so unsatisfactory there were many who favored the substitution of zinc oxide or zinc carbonate for native calamine. It seems that Fox, an English physician, was the only one who believed that a native zinc carbonate was superior to a prepared product (8).

In the years following 1880 and as late as 1910, workers continued to find that native zinc carbonate was still not being supplied for calamine, the common substitutes being barium sulfate, prepared zinc carbonate and zinc silicate.

At about the turn of the century it seems that interest in the composition of native calamines waned. The National Formulary IV (1916) admitted a prepared calamine, described as calcined native zinc carbonate or calcined zinc carbonate containing a small amount of ferric oxide. In the National Formulary V the product was zinc oxide together with a small amount of ferric oxide and silica. Prepared calamine of the National Formulary VI is described as being zinc oxide colored with ferric oxide. It should be stated, perhaps, that the color of calamine whether natural or prepared seems to have had a great deal to do with its acceptance as a medicinal agent.

To-day the native calamine is virtually unknown on the American market. On the other hand prepared calamine is well known and used as a healing and protective agent. It is popular in the form of lotions, liniments and ointments.

Inasmuch as calamine has always been a product of roasted minerals, we may say that our official product, though highly refined, is not essentially different from that used by the Romans. In view of the facts so far as we know them we favor the continuation of prepared calamine as an official product.

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(7) Davis, R. H., *Pharm. J.*, 26, 207 (1866).

(8) Fox, T., *Ibid.*, 34, 381 (1874).

BUREAU OF NARCOTICS.

(T. D. 29.)

AMENDING ARTICLE 82 OF NARCOTIC REGULATIONS NO. 5, TO EXTEND THE TIME WITHIN WHICH ORDER FORMS FOR NARCOTICS MAY BE FILLED.

Pursuant to the authority contained in Section 1 of the Act of December 17, 1914 (38 Stat. 785; U. S. Code (1934 Ed.) Title 26, Sec. 1049), as amended by Section 703 of the Revenue Act of 1926 (44 Stat. 9, 96) and Section 806 of the Revenue Act of 1936 (49 Stat. 1648, 1745), Article 82 of Narcotic Regulations No. 5, approved June 1, 1938, is hereby amended to read as follows:

"Art. 82. *Filling of Orders.*—The consignor shall enter upon the order form the number and size of the stamped packages furnished on each item and the date when each item is filled. When an order can not be filled in its entirety it may be filled in part and the balance supplied by additional shipments within 60 days from the date of the order form. A notation, covering each shipment, showing the actual quantities supplied and the date of delivery, shall be made by the vendor on the original and by the vendee on the duplicate."

ASSOCIATION BUSINESS

AD INTERIM BUSINESS OF THE COUNCIL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 1938–1939.

Office of the Secretary, 2215 Constitution Ave., Washington, D. C.

LETTER NO. 4.

January 12, 1939.

To the Members of the Council:

33. Use of Text of N. F. VI. Motion No. 5 (Council Letter No. 3, page 55) has been carried with the following members voting: YES—Ch, Fi, Li, Hi, Co, Ck, Je, Sw, La, Ga, Mi, Mo, Ke, Du, Ro.

The following communication has been received from Chairman DuMez of the Committee on Publications:

"Since Lea and Febiger were given permission to quote from the text of the fifth edition of the National Formulary in 'Caspari's Treatise on Pharmacy,' it is recommended that permission be again given this firm to quote from the N. F. VI in the new revision of this textbook.

I have reviewed the manuscript of B. V. Alfredson, D.V.M., for a laboratory manual and find that the use of the text of the N. F. VI is entirely satisfactory. I, therefore, recommend that Professor Alfredson be given permission to use the text of the N. F. VI in the preparation of a laboratory manual for veterinary students and that the fee be omitted if possible. This laboratory manual will be mimeographed and is intended to serve the veterinary students at Michigan State College, the total enrollment of such students at this institution being 64."

(*Motion No. 9*) It is moved by DuMez that Lea and Febiger be granted permission to use portions of the text of the N. F. VI in the new revision of "Caspari's Treatise on Pharmacy" with the usual fee of $5.00 and that B. V. Alfredson, D.V.M., be granted permission to use portions of the text of the N. F. VI in the preparation of a laboratory manual for veterinary students for value received, and with the customary acknowledgment in both cases.

34. Committee on Uniform State Drug and Cosmetic Laws. Motion No. 6 (Council Letter No. 3, page 8) has been carried with the following members voting: YES—Ch, Fi, Li, Hi, Co, Ck, Je, Sw, La, Ga, Mi, Mo, Ke, Dm, Ro.

35. Excess Stocks of Proceedings, Year Books and N. F. IV. Motion No. 7 has been carried with the following members voting: YES—Ch, Li, Hi, Co, Ck, Je, Sw, La, Ga, Mi, Mo, Ke, Dm, Ro. Copies of N. F. IV will be offered to College of Pharmacy libraries.

36. Election of Members. Motion No. 8 (Council Letter No. 3, page 11) has been carried with the following members voting: YES—Ch, Fi, Li, Hi, Co, Ck, Je, Sw, La, Ga, Mi, Mo, Ke, Dm, Ro. Applicants for membership numbered 19 to 149, inclusive, are declared elected.

37. Selection of an Auditor. The Committee on Finance recommends the employment of W. A. Johnson, Baltimore, Md., to audit the accounts of the ASSOCIATION for 1938, in accordance with Article VIII of Chapter IV of the By-Laws. Mr. Johnson has audited the accounts of the ASSOCIATION since 1922 and the appropriation for the audit has been $75.00 for each year.

(*Motion No. 10*) It is moved by Swain that W. A. Johnson, Baltimore, Md., be selected to audit the accounts of the ASSOCIATION for 1938 at a cost of $75.00.

38. Alabama Polytechnic Institute Student Branch. The following application accompanied by the membership applications and dues of the signers, together with the proposed Preamble, Constitution and By-Laws, have been received:

"The following students of the Alabama Polytechnic Institute School of Pharmacy desire to establish a Student Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, and do hereby petition the Council of the ASSOCIATION to approve the formation of the Branch and its Preamble and Constitution as submitted herewith:

James D. Bozeman	Fred T. Hebson	Oliver T. Thagard, Jr.
William P. Swift, Jr.	George S. Hiller	Benjamin J. Eich
Arthur C. Sansing	Thomas H. Cox	Charles R. Barron

Mary Mitchell
Beth M. Murphy
Dan E. Murphree
Warren C. Dow
Ted W. Ham
James L. Meigs
Lynton E. Godwin
Alvin H. Lurie
James W. Hodges
Middleton C. Pittman

PREAMBLE.

We, the students of the Alabama Polytechnic Institute School of Pharmacy in the city of Auburn, Alabama, in order to acquire a better knowledge of our professional problems, to assist in every way possible to further elevate the practice of Pharmacy, to aid in the advancement of pharmaceutical knowledge, and to stimulate a greater professional interest in our students, do hereby *resolve* to constitute ourselves into a Student Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, and in doing so we adopt and accept the following Constitution and By-Laws.

CONSTITUTION.

ARTICLE I—*Name*. The name of the organization shall be the Alabama Polytechnic Institute Student Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION; abbreviated A. P. I. Br. of A. PH. A.

ARTICLE II—*Membership*. Section 1. The membership of the organization shall be made up of bona-fide students in the School of Pharmacy.

Section 2. Members are to be elected by a two-thirds vote of those present, provided a quorum is present.

ARTICLE III—*Amendments*. Section 1. This constitution shall be amended only upon vote of three-fourths of the members of the organization at the time the amendment is presented.

Section 2. Proposed amendments must be submitted in writing at the meeting preceding the meeting at which the voting upon the proposed amendment is to take place.

Section 3. The constitution shall be amended in no way that shall conflict with the policy of the AMERICAN PHARMACEUTICAL ASSOCIATION toward Student Branches.

BY-LAWS.

ARTICLE I—*Officers*. Section 1. The officers of this Branch shall be (*a*) president; (*b*) vice-president; (*c*) secretary; (*d*) treasurer; and (*e*) faculty advisor.

Section 2. Delegates may be elected to the House of Delegates at any desired time. Any of the officers may be delegates if desired.

ARTICLE II—*Committees*. At the first meeting of each fiscal year, or as soon thereafter as possible, the president shall appoint four standing committees as follows:

Section 1. *On Membership:* To consist of three members.

Section 2. *On Programs:* To consist of three members.

Section 3. *On Science and Practice of Pharmacy:* To consist of three members.

Section 4. *Executive:* To consist of the vice-president as chairman, the chairmen of all standing committees, and as ex-officio, the president, the secretary and the treasurer.

Section 5. The president may appoint any temporary committees that he may deem necessary.

ARTICLE III—*Duties*. Section 1. It shall be the duty of the president to preside at all meetings of the Branch, to appoint committees and to maintain order in the meetings.

Section 2. It shall be the duty of the vice-president to preside at all meetings of the Branch in the absence of the president, and to help the president in maintaining order in the meetings, and in all other ways when called upon by the president to do so.

Section 3. It shall be the duty of the secretary to maintain fair and correct minutes of the meetings, and to send reports of the same to the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, and to such journals and newspapers as he deems proper. He shall preserve on file all reports and papers of every description presented to the Branch, and shall be charged with the necessary business correspondence. He shall read all papers handed to him by the president for that purpose, and shall call and record ayes and nays, whenever they are required to be called. He shall notify the chairman of every standing and special committee of his appointment, giving him a list of his colleagues and stating the business upon which the committee is to act. He shall

notify every member, at least one week in advance, of the time and place of the meeting. He shall preside at all meetings in the absence of both the president and the vice-president.

Section 4. It shall be the duty of the treasurer to collect and take charge of the funds of the Branch, and to give receipts for the same. He shall pay no money except upon the order of the secretary countersigned by the president. He shall present a statement of his accounts whenever called upon by the president to do so. He shall receive the amount of his expenses incident to the duties of his office.

Section 5. It shall be the duty of the Committee on Membership to investigate and recommend all applicants for membership at least one week prior to the next regular scheduled meeting of the Branch. The applicant shall be presented to the committee by a member of the Branch.

Section 6. It shall be the duty of the Committee on Programs to obtain speakers, and to otherwise arrange the program section of the meeting.

Section 7. It shall be the duty of the Committee on Science and Practice of Pharmacy to investigate and report at each meeting developments in the practice of the profession of interest to members.

Section 8. It shall be the duty of the Executive Committee to transact business of the Branch in an emergency or during the period between regular meetings.

ARTICLE IV—*Meetings*. The meetings will take place on the second Monday of each month at the appointed time.

ARTICLE V—*Meeting Place*. The meeting place shall be the Ross Chemical Laboratory, Alabama Polytechnic Institute, Auburn, Alabama.

ARTICLE VI—*Quorum*. One-half (1/2) the number of members of the Branch shall constitute a quorum.

ARTICLE VII—*Fiscal Year*. The fiscal year of the Branch shall be from the first day of January to the first day of January of the following year.

ARTICLE VIII—*Elections*. The officers shall be elected by ballot of a majority at the first meeting of the fiscal year, and shall be installed at the same meeting, and shall serve for one year or until their successors have been elected.

ARTICLE IX—*Order of Business*. The order of business shall be as follows: (1) Reading of the minutes of the previous meeting; (2) Introduction of newly elected members; (3) Unfinished or deferred business; (4) New business; (5) Program; (6) Nominations and elections; (7) Adjournment.

ARTICLE X—*Miscellaneous*. Every proposition to alter or amend these By-laws shall be submitted in writing at a stated meeting of the Branch, and may be balloted for at any subsequent stated meeting, when, upon receiving the votes of three-fourths of the members of the Branch, it shall become a part of the By-laws."

(*Motion No. 11*) It is moved by Little that the application to establish the Alabama Polytechnic Institute Student Branch of the ASSOCIATION and the proposed Preamble, Constitution and By-laws be approved.

39. Applicants for Membership. The following applications, properly endorsed, accompanied with the first year's dues, and recommended by two members of the ASSOCIATION, have been received:

Nos.: 150, Benjamin L. Milana, 134-28-234 Street, Laurelton, L. I., N. Y.; 151, Frank Kozlicki, 2619 N. St. Louis Ave., Chicago, Ill.; 152, J. Raymond Bressler, 380 Ridgeway Ave., Rochester, N. Y.; 153, Glenn L. Metz, 206 E. Gift Ave., Peoria, Ill.; 154, Richard L. Davis, 246 W. Broad, Darlington, S. C.; 155, S. P. Lucia, 2529 Union St., San Francisco, Calif.; 156, J. H. Baker, 2 Park Ave., New York, N. Y.; 157, Denzil D. Cockerham, Box 134, Galax, Va.; 158, Nancy B. King, Surry, Va.; 159, Charles C. Cramer, Gardner, Kans.; 160, Harry Seidman, 5324 Arlington St., Philadelphia, Pa.; 161, John J. Debus, 383 Ocean Ave., Jersey City, N. J.; 162, Edward M. Altman, 51 Savoy St., Providence, R. I.; 163, Roy A. Bowers, Univ. of Wisconsin, Madison, Wis.; 164, Kathleen H. Neumann, 2350 W. Fond du Lac Ave., Milwaukee, Wis.; 165, Ruth C. Moore, 2871 N. 45th St., Milwaukee, Wis.: 166, Charles C. K. Chang, Adams Hall, Madison, Wis.; 167, Val Bond, Hoeser, Durand, Wis.; 168, Richard E. Streu, 1518 25th St., Two Rivers, Wis.; 169, Joseph I. Ryan, 360 Pearl St., Brooklyn, N. Y.; 170, Jamie F. Badgett, 6650 Devonshire Ave., St. Louis, Mo.; 171, George P. Wilson, 227 Eldon Ave., Columbus, O.; 172, Edward J. Froncek, 1747 S. 28th St., Milwaukee, Wis.; 173, Julius Muller, 6824 15 Ave.,

Brooklyn, N. Y.; 174, Israel Niss, 3627—13th St., N. W., Washington, D. C.; 175, Robert L. McNeil, Jr., 8917 Crefeld St., Philadelphia, Pa.; 176, William S. Stevens, 1345 Haines Ave., Columbus, O.; 177, Richard S. Warner, 2049 E. Michigan Ave., Upsilanti, Mich.; 178, George R. Neupert, 602 University Ave., Urbana, Ill.; 179, Eldon Roberts, Jr., Memorial Hospital, Richmond, Va.; 180, Herman C. Shuptrine, Tampa Drug Co., Tampa, Fla.; 181, William L. Snow, 3661 Broadway, New York, N. Y.; 182, Alexander Zuchlewski, 18001 Conant, Detroit, Mich.; 183, James Shaver, 626 Air Brake Ave., Wilmerding, Pa.; 184, Karl B. Rosen, 2215 Constitution Ave., N. W., Washington, D. C.; 185, Joseph A. Lewicki, 4301 Archer Ave., Chicago, Ill.; 186, Leo E. Kantor, 12302 Jamaica Ave., Richmond Hill, N. Y.; 187, Louis Trywusch, 1620 Third Ave., New York, N. Y.; 188, Ruth L. Kotershall, 2833 W. 25 St., Cleveland, O.; 189, Gertrude Horsch, 1092 Rushleigh Rd., Cleveland Hts., O.; 190, Jo May Zeisig, 1234 Fillmore St., Philadelphia, Pa.; 191, Henry H. Smith, 3412 Owen Ave., Austin, Tex.; 192, W. R. Offutt, 115 S. Third St., Louisville, Ky.; 193, Robert Wallace Ray, 1434 S. First St., Louisville, Ky.; 194, Charles E. Rowe, Plocks Drug Store, Bloomfield, Ky.; 195, Moses G. Brudno, 500 Commonwealth Ave., Boston, Mass.; 196, Joseph J. Hammer, 551 Fifth Ave., New York, N. Y.; 197, Max Brooks, 4330—18th Ave., Brooklyn, N. Y.; 198 Harry H. Hodes, 6124–26 Roosevelt Ave., Woodside, Queens, N. Y.; 199, Ralph H. Cheney, 300 Pearl St., Brooklyn, N. Y.; 200, Louis Greifenstein, 8614 S. Hermitage Ave., Chicago, Ill.; 201, Stanley H. Prijatel, 6728 St. Clair Ave., Cleveland, O.; 202, Jacob Rosenfeld, 1581 Watson Ave., Bronx, N. Y.; 203, August Ziegler, 2917—37 Ave., Long Island City, N. Y.; 204, Isadore Arnove, 541 Roscoe, Chicago, Ill.; 205, Abraham Kaufman, 2161 Broadway, New York, N. Y.; 206, Louis J. Schulberg, 276 S. 1st St., Brooklyn, N. Y.; 207, Julius Lichtenfeld, 753—3rd Ave., Brooklyn, N. Y.; 208, Joseph Mishkin, 1714 Amsterdam Ave., New York, N. Y.; 209, Daniel Ungar, 1916 Bergen St., Brooklyn, N. Y.; 210, William F. Silvers, 81 St. Pauls Place, Brooklyn, N. Y.; 211, Abraham Diamond, 200 E. Tremont Ave., New York, N. Y.; 212, Kenneth G. Spangler, 1728 N. Montford Ave., Baltimore, Md.; 213, Earl M. Norris, 4706 Liberty Heights Ave., Baltimore, Md.; 214, William W. Logan, Box 303, University, Miss.; 215, Lucien A. Schaible, 2600 Hudson Blvd., Jersey City, N. J.; 216, Edwin J. Rathbun, 2060 E. 100th St., Cleveland, O.; 217, Abraham B. Schapiro, 4501 Park Heights Ave., Baltimore, Md.; 218, William H. Kammer, 7012 Preston St., Baltimore, Md.; 219, Robert L. Morin, 81 Franklin St., Danielson, Conn.; 220, Ben Pestreich, 858 Fulton St., Brooklyn, N. Y.; 221, Morris Shkolnick, 2032 Madison Ave., New York, N. Y.; 222, Benjamin Heisch, 1135 Nelson Ave., New York, N. Y.; 223, Louis Myman, 1560–64 Park Pl., Brooklyn, N. Y.; 224, Robert C. Dix, Main St., Nicholson, Pa.; 225, Raymond L. Howard, 333 E. Florida Ave., Hewet, Calif.; 226, Merrill A. Hay, 594 Congress St., Portland, Me.; 227, Geo. N. Netsky, 2655 S. 10th St., Philadelphia, Pa.; 228, L. A. Weidle, 462 N. Taylor Ave., St. Louis, Mo.; 229, David W. Eisman, 1506 Market St., Philadelphia, Pa.; 230, Edgar S. Belle, 116 Pondfield Rd., Bronxville, N. Y.; 231, Dewitt H. Hunt, 10 Clinton Ave., St. Johns, Mich.; 232, Thos. Rosenthal, 1408 N. Grand Blvd., St. Louis, Mo.; 233, Antoinette, M. Lizzadro, 2130 W. Polk St., Chicago, Ill.; 234, Joseph F. Than, 3051 E. 65th St., Cleveland, O.; 235, Hyman J. Rosovsky, 5624—8th Ave., Brooklyn, N. Y.; 236 Lodi Mandel, 15702 Waterloo, Cleveland, O.; 237, Herbert I. Bluestone, 2 E. 59th St., New York, N. Y.; 238, Fred C. Powers, 1014 Sonora Ave., Glendale, Calif.; 239, Sister M. Elizabeth, St. Joseph Hospital, Orange, Calif.; 240, Kiyomi Kawamoto, Rt. No. 1 Box 490-B, Lomito, Calif.; 241, Satsuki Nakao, 120 N. Bonnie Beach Pl., Los Angeles, Calif.; 242, Max Loman, 2531 Folsom St., Los Angeles, Calif.; 243, James Corn, 2453 Cincinnati St., Los Angeles, Calif.; 244, Quentin Tobias, 1714 Aid-Eevin St., Glendale, Calif.; 245, Benjamin Karpman, 2453 Baulder St., Los Angeles, Calif.; 246, Jack Greenstein, 530 N. Feskett, Los Angeles, Calif.; 247, Arnold Finkelstein, 2817 Buckingham Rd., Los Angeles, Calif.; 248, Thomas W. Jones, 846 Redondo Ave., Long Beach, Calif.; 249, Roger W. Marquand, 525 E. Market St., Akron, O.; 250, Paul W. Wilcox, Sharp & Dohme, Inc., Glenolden, Pa.; 251, Henry W. Del Vecchio, 1047—72nd St., Brooklyn, N. Y.; 252, Theodore H. Blonder, 1892 Milwaukee Ave., Chicago, Ill.; 253, Merritt C. Harper, 224 E. Main St., Madison, Ind.; 254, Sister Mary Loyola, Keenan, 22nd St. & Conner Ave., Joplin, Mo.; 255, Samuel Zweig, 601 W. 151 St., New York, N. Y.; 256, Beverly F. Towne, 455 Buena Vista, San Marino Calif.; 257, Gordon W. Haack, 3017 N. E. 13th Ave., Portland, Ore.; 258, John F. Wannenwetch, 4123 Frederick Ave., Baltimore, Md.; 259, James E. Griffin, 216 E. 11th, Kansas City, Mo.; 260, Myron A. Jacobson, 116 Campbell Ave., West Haven, Conn.; 261, Sam S. Robbins, 4401 Liberty Hts., Baltimore, Md.; 262, Oscar Abrin, 130–26 Rockaway

Blvd., S. Ozone Park, N. Y.; 263, Adolph V. Palumbo, 5 Ambar Place, Bernardsville, N. J.; 264, Grover C. Kohl, 672 Cherry, Terre Haute, Ind.; 265, Martha Lotz, 821 Lancaster St., Albany, N. Y.; 266, Sister Mary Vera Jendrusch, 602 Green St., Danville, Ill.; 267, Earl C. Bohnsack, 318 Main, Valley City, N. Dak.; 268, Homer T. Mulkey, 1500 Colorado St., Austin, Tex.; 269, Elmon L. Cataline, Univ. of Toledo, Toledo, O.; 270, Joseph M. Jacobs, 75 College St., New Haven, Conn.; 271, Benjamin D'Ari, 211 Broadway, Monticello, N. Y.; 272, Joseph Rescigno, 2227—2nd Ave., New York, N. Y.; 273, Joseph P. Crisalli, 420 Clinton St., New York, N. Y.; 274, Percy H. Jackson, Oak & Pacific Aves., Wildwood, N. J.; 275, George H. McFadden, 4510 Main, Apt. 107, Kansas City, Mo.; 276, Edward F. Reichert, 1051 Barrett Ave., Louisville, Ky.; 277, Thomas J. Macek, Univ. of Florida, Gainesville, Fla.; 278, Emild Norwood, 3220 Broadway, Ft. Wayne, Ind.; 279, Joshua Myron, 601 W. 113 St., New York, N. Y.; 280, Francis C. Brown, 74 Gold St., New York, N. Y.; 281, Samuel A. Bengen, 29 N. 12th St., Minneapolis, Minn.; 282, Max Marrett, 1533 Townsend Ave., New York, N. Y.; 283, Sister M. Anselma Betzen, 185 Hazel St., Oshkosh, Wis.; 284, Valerie C. Armbruster, St. Bernard, La.; 285, John T. Benedict, 5602 Canal Blvd., New Orleans, La.; 286, Rose M. Bertin, 2604 N. Rampart, New Orleans, La.; 287, Peggy L. Butcher, Mahle Apt. 5, 300 Conti St., Mobile, La.; 288, Melanie L. Cassou, 1620 Pauger St., New Orleans, La.; 289, Bennie P. Cucchiara, Independence, La.; 290, Gaston A. de la Bretonne, Abita Springs, La.; 291, Hugh W. Griffon, 1206 Court St., Plaquemine, La.; 292, Walter L. Hall, Goodhope, La.; 293, Urban J. Hecker, 8416 Fig St., New Orleans, La.; 294, Alfred K. Kahn, Rayne, La.; 295, Anna Mae Liuzza, 1723 Ursuline Ave., New Orleans, La.; 296, Ronald L. Macke, 727 Washington Ave., New Orleans, La.; 297, Herbert J. Mang, 1140 Loyola Ave., New Orleans, La.; 298, Edward C. Montero, Marti 165, Moron, Camaguey, Cuba; 299, Anna F. Palmisano, 3809 La. Ave. Parkway, New Orleans, La.; 300, Estella H. Trillo, Tarafa Ave., 40, Moron, Camaguey, Cuba; 301, Ethel C. Wagner, Box 31, Ponchatoula, La.; 302, Carl D. Lovotti, 450 Sutter St., San Francisco, Calif.; 303, Arthur Bersin, 34–58—74th St., Jackson Hts., N. Y.; 304, James D. Bozeman, Garden Ct. Apts., Auburn, Ala.; 305, William P. Swift, Jr., 135 West Glenn Ave., Auburn, Ala.; 306, Arthur C. Sansing, 333 N. Gay St., Auburn, Ala.; 307, Mary Mitchell, 280 E. Thach Ave., Auburn, Ala.; 308, Beth M. Murphy, 388 N. College St., Auburn, Ala.; 309, Dan E. Murphree, Wittel Dormitory, Auburn, Ala.; 310, Fred T. Hebson, Kappa Sigma House, Auburn, Ala.; 311, George S. Hiller, Pi Kappa Phi House, Auburn, Ala.; 312, Thomas H. Cox, 371 N. College St., Auburn, Ala.; 313, Warren C. Dow, 137 W. Glenn Ave., Auburn, Ala.; 314, Ted W. Ham, 232 W. Magnolia Ave., Auburn, Ala.; 315, James L. Meigs, 112 E. Magnolia Ave., Auburn, Ala.; 316, Oliver L. Thagard, Jr., 253 E. Glenn Ave., Auburn, Ala.; 317, Benjamin J. Eich, S. P. E. House, Auburn, Ala.; 318, Charles R. Barron, Alumni Hall, Auburn, Ala.; 319, Alvin H. Lurie, 434 E. Magnolia Ave., Auburn, Ala.; 320, James W. Hodges, 119 Cedar Drive, Auburn, Ala.; 321, Middleton C. Pittman, 309 Payne St., Auburn, Ala.; 322, Lynton E. Godwin, Alumni Hall, Auburn, Ala.; 323, Milton J. Sappe, 1184 Washington Blvd., Baltimore, Md.; 324, Max Cedar, 1327 Newkirk Ave., Brooklyn, N. Y.; 325, Harry Fried, 787 Albany Ave., Brooklyn, N. Y.; 326, Frederic W. Wheeler, 31 Main St., Springfield, Vt.; 327, Paul J. Kunkel, 1806 E. Main St., Waterbury, Conn.; 328, Russell W. Archer, 227 Clifford Ct., Madison, Wis.; 329, Aubrey Springer, 1414 Amsterdam Ave., New York, N. Y.; 330, Thomas F. Cowley, 233 Greene Ave., Brooklyn, N. Y.; 331, John C. Gelenius, 143–12—45 Ave., Flushing, N. Y.; 332, Albert H. Posner, 1268 Olmstead Ave., Bronx, N. Y.; 333, Emanuel Saffran, 7328 Metropolitan Ave., Maspeth, L. I., N. Y.; 334, Lillian V. Tulley, 1362 Belmont, Chicago, Ill.; 335, Alva L. Adams, 309 Park Ave., Glencoe, Ill.; 336, Chauncey E. Rickard, 600 N. Second St., Harrisburg, Pa.

(*Motion No. 12*) Vote on applications for membership in the ASSOCIATION.

40. Life Members. The following have become Life Members by payment of dues for thirty-seven consecutive years:

Stevens, Frederick S., Auburn Calif.; Snow, Clyde M., 358 Dearborn St., Chicago, Ill.; Appleton, William R., Box 162, Warren, Ark.; Greul, Albert M., 4th & Overton Sts., Newport, Ky.; Wilcox, Levi, 22 Mitchell Ave., Waterbury, Conn.; Peters, Henry A., 200 N. Main St., Oconomowoc, Wis.; Anspach, Paul B., 334–336 Northampton St., Easton, Pa.; Mikkelsen, Niels, Kenesaw, Neb.; Whitney, David V., 3722 E. 12th St., Kansas City, Mo.; and the following through payment of other amounts as specified in the By-Laws: Bower, Edwin L., 4 Washington Ave., Tenafly, N. J.; Husa, William J., University of Florida, Gainesville, Fla.; Worthington, J. Warren Wolfe, State Hospital, Norristown, Pa. E. F. KELLY, *Secretary*.

PROCEEDINGS OF THE LOCAL BRANCHES

GREATER ST. LOUIS.—The members of the Branch were guests of the Local Branch of the American Chemical Society on January 9, 1939, at the St. Louis University School of Medicine.

Dr. Lionel Joseph gave an illustrated lecture, "Carcinogenic Compounds," in which he discussed the relationship between chemical compounds and cancer producing activity. A study of the history of the production of artificial cancer can be traced back to the observations that men employed in the tar industry develop cancer. Tar was fractionated and the various constituents tested on rats to note which were responsible for producing cancer. Up to date, many derivatives of benzanthracene have been tested and found to be cancer-producing. This is also true in the case of various nitrogen derivatives as well as certain dyes.

Of interest was the mode of application of these chemicals. Rats are generally used as test animals and a solution of the chemical may be painted on or injected beneath the skin. It was found that the injection method brought speedier reaction and was more economical.

The next meeting of the Branch will be held at the St. Louis College of Pharmacy, February 13, 1939, at 8 P.M.

FRANK L. MERCER, *Secretary.*

LOYOLA UNIVERSITY STUDENT BRANCH.—The regular meeting was held on January 13th, at ten A.M., with thirty-five members and eight guests in attendance.

President Babin stressed the objectives of these meetings, pointing out that we aim to stimulate extra-curricula activities among students as well as the discussion of current pharmaceutical topics among pharmacists of this section of the country.

Miss Helen Pitre, Junior Student Member, read a very interesting and instructive paper on "Emulsions in Pharmacy." The difficulties experienced in the mortar and pestle method of preparation were stressed and then it was indicated how these are simplified by the use of the homogenizer. The importance of proper emulsifying agents for various emulsions was carefully illustrated.

Mr. Clarence Dupre, superintendent of the New Orleans Branch of Eli Lilly & Co., for the past twenty-five years spoke on "Pharmacy from its Commercial Aspects." He stressed the cause and effects of depression in his speech and also brought out the basis of professional success. The thought of considering quality before price when it comes to dealing with health was emphasized. Mr. Dupre also gave a brief description of the profit and loss statement of 525 retail drug stores.

The treasurer's report was presented and approved.

An announcement was made that Mr. William A. Worner, president of the Louisiana State Board of Pharmacy, and Dean J. F. McCloskey, together with wholesale pharmacists and the Branch are planning the First National Pharmacy Day in New Orleans. Invitations will be sent to Dr. L. Leon Lascoff, one of the most outstanding pharmacists in the world to-day, and president of the AMERICAN PHARMACEUTICAL ASSOCIATION; Dr. R. L. Swain, authority on Pharmaceutical Law; and Dr. C. L. O'Connell, Dean of the Pittsburgh College of Pharmacy. A banquet and dance will follow the business meeting.

The next meeting will be held on February 9th.

ROSALIE CENTANNI, *Secretary*

NEW YORK.—The regular meeting was called to order at 8:45 P.M. on Monday evening, January 9, 1939, at Columbia University, College of Pharmacy, New York City. President Canis presided and about 200 members and guests were present. The minutes of the December meeting were approved as read.

The Treasurer's Report showed a balance of $260.35.

Since the last meeting application for membership of Mr. Samuel Zweig was received.

Mr. Lehman read the report of the Committee on Education and Legislation, which was accepted.

A letter from Dr. Ernest Little, chairman of the Committee on Student and Local Branches in which he complimented the Branch on the success of its meetings, was read. An invitation

was extended to attend the meeting of the New Jersey Branch at New Jersey College of Pharmacy, 1 Lincoln Avenue, Newark, N. J., January 27th.

A letter from Mr. C. Ingram, president of the R. D. A. of New York, asked for a contribution to make up a deficit incurred in securing the reëlection of Senator Feld, who is a co-author of the Feld-Crawford bill. The matter was referred to the Executive Committee on motion of Mr. Lehman, seconded by Mr. Bardfeld.

President Canis pointed out that Mr. Nathaniel Nicolai was present, after long absence due to illness.

Dr. J. Leon Lascoff, president of the A. PH. A., was introduced.

After election of officers the meeting was turned over to the Scientific Section. Dr. Frederick M. Allen spoke on the "History, Etiology, Physiology, Treatment and Prognosis of Diabetes," Dr. Charles F. Bolduan on the "Public Health Aspects of Diabetes;" and Dr. William S. Collins on "Crystalline Insulin and Its Variations, with Some Comment on Oral Medication in Diabetes." Exhibits by Becton-Dickinson and Co., E. R. Squibb and Eli Lilly were displayed.

Following the discussion, a rising vote of thanks was accorded the speakers and the meeting adjourned.

HORACE T. F. GIVENS, *Secretary.*

PHILADELPHIA.—The January meeting was held Tuesday evening, the 10th, at the Philadelphia College of Pharmacy and Science, and was called to order at 8:00 P.M. by President Viehoever. The secretary read the minutes of the December meeting, which were approved.

Mr. Drain of the membership committee nominated Mr. Mark Baldwin, who was unanimously elected to associate membership.

The Treasurer's Annual Report, accompanied by a certificate of audit by Dr. Frank H. Eby, was read. It showed a cash balance on deposit in the regular checking account of $282.99, and a balance of $49.92 in the special savings account. The report was as of December 31, 1938, and was accepted.

Dr. Blythe made a motion, seconded by Prof. Nichols, that inasmuch as Dr. Leon Lascoff, President of the A. PH. A., will address the Branch at the March meeting and since Dr. Lascoff is one of the world's outstanding pharmacists, the Branch extend an invitation to the members of the P. A. R. D. to attend this meeting. The motion was carried.

Mr. W. W. McNeary was then asked by President Viehoever to introduce the speaker of the evening, Dr. George Raiziss, Professor of Chemotherapy in the Graduate School of Medicine of the University of Pennsylvania. Mr. McNeary in his introduction referred to the association of the speaker with Dr. J. A. Kolmer and Dr. J. F. Schamberg in the great task of supplying arsphenamine to the allied powers at the time the supply was cut off from Germany during the late war. Dr. Raiziss spoke briefly about the early investigators in the field of chemotherapy and the developments that lead to the discovery of arsphenamine; the chemotherapy of bacterial infections; the chemistry of sulfanilimide and its derivatives; new possibilities in the chemistry and chemotherapy of diamino diphenyl sulfone and sulfanilimide pyridine. The discussion following his address was participated in by Messrs.: Ehrenstein, Osol, McNeary, Drain and others. Dr. Raiziss was accorded a rising vote of thanks for his splendid talk.

ARTHUR K. LEBERKNIGHT, *Secretary.*

WESTERN NEW YORK.—The January meeting was held at the University of Buffalo, with an attendance of nearly one hundred. The speaker was Dr. Robert C. Page, Medical Adviser to Burroughs Wellcome & Co., and an alumnus of the School of Pharmacy. His topic was, "Glandular Products in the Treatment of Deficiency Diseases." The progress being made in this field and the products now in use were described in a very interesting and informative paper.

Refreshments were served by the Alumnae of the School of Pharmacy during the interval between the lecture and the question period. Questions were later answered by Dr. Page and Dr. Ivan Hekimian, assistant Professor of Medicine in the Medical School of the University.

The next meeting will be held on February 9, 1939. The speaker will be Dr. Ralph W. Clark, of the Pharmacy Service Division, Merck & Co., whose topic will be "New Organic Therapeutic Compounds." Questions following the lecture will be answered by Dr. Clark and Dr. L. Maxwell Lockie.

LAURENCE D. LOCKIE, *Secretary.*

PERSONAL AND NEWS ITEMS.

From **Dr. Clifford S. Leonard,** Burlington, Vt., comes the following:

"We note in *Farm. Revy,* 37 (1938) 697, a description of the new laboratory of the technical division of the Swedish Royal Pharmaceutical Institute in Stockholm. A floor plan is given. Pictures show aspects of the various rooms and certain special apparatus. There are six rooms: office, a main laboratory, also housing semi-large scale vacuum distilling apparatus, a tablet room, with tablet machines and a sugar-coating pan, a bottle room, an extraction room, with percolators mounted on wall brackets in a manner shown in separated illustrations, an homogenizer is also located here; a pulverizing room with mills and a roller table for ball mills completes the set-up. The laboratory appears to be excellently equipped for the study of processes which may be recommended to the Swedish apothecaries for preparations such as are frequently made in the local apothecary's work-room, under the continental system."

Sister Serena has been pharmacist at Providence Hospital, Washington, D. C., for fifty-nine years and while incapacitated by injuries she is interested in her work, which she can do, seated in her wheel chair. She received her certificate from the Board of Pharmacy by examination, and is nearing her 80th birthday anniversary.

Dr. Phillip G. Ackermann has recently joined the Research staff of Cole Chemical Co., Inc., St. Louis, Mo., after obtaining his Ph.D. Degree in Chemistry through five years Post-Graduate work at Johns Hopkins University. **Merle M. Jackson, M.S.,** of Kansas State College and Park College, has also recently become a member of their Control and Research Department.

Temple University School of Pharmacy, Philadelphia, Pa., has established a pharmacy interneship, to be available each term to a student who is outstanding in scholarship and character, and whose interests run toward professional and scientific pharmacy. This interneship is made possible through the coöperation of Temple University Hospital. A graduate of the school will be appointed at the conclusion of each term to serve as an interne in the hospital for the purpose of becoming proficient in hospital pharmaceutical practice and management. Mr. Leo Wolfe was the first to be appointed.

Dr. Robert Lee Swain, Baltimore, Md., has been named editor of *Drug Topics and Drug Trade News,* to succeed the late Jerry McQuade. Dr. Swain has been pharmacy editor of *Drug Topics* since 1934. He is also a member of the U. S. P. Board of Trustees, president of the Maryland Pharmaceutical Association, secretary-treasurer of the Maryland Board of Pharmacy, Deputy Food and Drug Commissioner of the Maryland State Department of Health, and Professor of Pharmaceutical Law at Temple University.

Dr. Samuel Colville Lind, dean of the Institute of Technology of the University of Minnesota, has been elected president of the American Chemical Society to take office in 1940. Dr. Lind assumed the title of president-elect on January 1, 1939, at which time Prof. C. A. Kraus of Brown University became president.

As president of the International Drug Club, **Dr. Wm. J. Schieffelin** is requesting coöperation in a movement to supply urgently needed drugs and pharmaceuticals to the civilian population of Spain. The supplies are to be contributed through the American Red Cross for distribution by the Friends Service Committee on an impartial basis to the civilian sufferers.

Carl T. Durham, Chapel Hill, N. Car., pharmacist, was elected to the House of Representatives at the last election. Mr. Durham had never sought a political career but the Committee could agree on no other man. He is recognized as a valuable citizen of the community, and is the first pharmacist from North Carolina to go to Congress.

Dr. Walter S. Landis, vice-president of the American Cyanamid Co., New York City, was presented with the Perkins Medal for 1939, at a joint meeting of the American section of the Society of Chemical Industry and the American Chemical Society, held at the Chemists' Club.

The First Aid Class of Fordham University, College of Pharmacy, had the pleasure of hearing **Dr. Raymond Ditmars,** curator of mammals and reptiles at the New York Zoölogical Park, speak on "Snake Venom and Serum." Dr. Ditmars illustrated by actually obtaining the venom from a four-foot water moccasin, one of the most dangerous of snakes. He also demonstrated the new suction cup for removing venom after a snake bite and advocated the use of both cup and serum for best results.

The N. A. R. D. has advised that it has been found necessary to change the dates of National First Aid Week from May 14th–20th as was first announced to the following week, May 21st–27th. The latter arrangement offers two advantages, it gets First Aid Week away from Mother's Day and it also is coincident with National Cotton Week which forms an excellent tie in.

Mr. Herbert Skinner, Ph.C., member of the Council of the British Pharmaceutical Society, will be retiring on March 31st from the position of chief pharmaceutist to the Royal Northern Hospital, Holloway, London, N. 7. In order to retain his association with the hospital, the board of management have appointed him as consulting pharmaceutist. Mr. Skinner joined the staff of the Royal Northern Hospital—then the Great Northern—in 1896 from Guys Hospital. He thus completes nearly forty-three years' service. He was elected to the Council of the Pharmaceutical Society in 1916 and was the president of the Society in 1927–1929 and chairman of the British Pharmaceutical Conference in Aberdeen in 1932. He was vice-chairman of the Revision Committee of the 1923 British Pharmaceutical Codex, chairman of the Committee of Revision publishing the 1934 Codex, and is the chairman of the present Revision Committee. Mr. Skinner is an Honorary member of the AMERICAN PHARMACEUTICAL ASSOCIATION.

Dr. Arno Viehoever, research professor of Biology at the Philadelphia College of Pharmacy and Science, was invited by the new Siamese government to act as its scientific advisor. He obtained a leave of absence from the college and has left for Bangkok. He will evaluate domestic curative agents.

Dr. H. A. Langenhan, has resigned as professor in Pharmacy at the University of Washington to devote his entire time to the management of the S. B. Penick Skagit Valley Goldenseal Farm. Dr. Langenham received his B.A. degree in Pharmaceutical Chemistry at the University of Illinois and his Ph.D. degree at the University of Wisconsin. He joined the faculty of the University of Washington in 1922 and became a full professor in 1928. He is recognized as an authority on hydrastis, or goldenseal root, having received the Ebert prize in 1932 for his paper on "A Phytochemical Investigation of Hydrastis Canadensis."

The Ninth Annual Druggists' Business Conference, sponsored by the Pharmacy Extension Department of Purdue University, LaFayette, Ind., will be held in the Memorial Union Building, March 21st and 22nd. Among the subjects to be discussed are: "General Merchandising," "Human Beings in Business," "Why Sell Vitamins?" "Social Security," "New Laws Affecting Pharmacy," "It's All in Your Mind," "Professional Atmosphere," "Most for the Least Money in Air Conditioning," "Merchandising the Prescription Department," "New Remedies," "Insecticides," "Know Your Ice Cream and Mix," "Clerk Training," and "Trends in Pharmacy and Medicine."

The evening program of the first day includes the Annual Dinner followed by a talk by Dr. R. G. Leland, Director, Bureau of Medical Economics, American Medical Association, on "Socialized Medicine and the Public." A second speaker will be, Mr. John J. Haramy on "Dictatorships in Action."

OBITUARY.

CHARLES HOWARD LAPOURAILLE

Mr. C. H. Lapouraille, widely known pharmacist of Baltimore, Md., died on Monday, January 16th, after several weeks illness.

After receiving his early education in the public schools, he entered the School of Pharmacy, University of Maryland; graduated in 1907, and became a registered pharmacist that year. Mr. Lapouraille was a member of a long-established pharmaceutical family, and spent all of his life in the pharmacy previously conducted by his father at 1345 Orleans Street. He was a member of the Maryland Pharmaceutical Association, Baltimore Retail Druggists' Association, and the AMERICAN PHARMACEUTICAL ASSOCIATION.

Funeral services were held at his residence January 19th, with interment in Loudon Park Cemetery. Mrs. Lapouraille survives him.

BOOK NOTICES AND REVIEWS.

Chemistry in Relation to Biology and Medicine with Especial Reference to Insulin, by JOHN JACOB ABEL, Ph.B., M.D. Published by Waverly Press, Inc., Baltimore, Md.

The Willard Gibbs lecture, delivered by John Jacob Abel before the Seventh Midwest Intersectional Meeting on the occasion of the award to Dr. Abel of the Willard Gibbs Gold Medal, a reprint from Science, has been printed under separate cover. The distinguished author was awarded the Gold Medal by the Chicago Section of the American Chemical Society on May 27, 1927.

Dr. Abel, in his lecture, traced the growth of Biochemistry from the beginning of its origin to the present day. He revealed the part which the old alchemists played in this phase of chemical development. Such men as Paneth, Paracelsus, Meyer, Boyle, Sudhoff, Lavoisier, Priestley and many others are given mention as to the invaluable importance their contributions were to biochemistral development. After the period of the alchemist had passed there was ushered in a more reasonable phase of Chemistry which resulted in the era of synthetic chemistry. Such men as Liebig and Wröhler are given mention as pioneers of this field. With the advance of science came the advent of the physical chemist who contributed to the assistance of the biochemist in his problems dealing with micro and ultramicrophysical structures, and the orientations of molecular structures. Of the endocrine glands Dr. Abel discusses the pancreas and its internal secretion product, insulin, with regard to the research leading to its discovery and recent developments due to his own endeavor in isolating and separating this important hormone of diabetic treatment.

Only a few copies of this book are available to those who wish to possess a remembrance of the "Father of American Pharmacology," a man who dedicated his life's work to the advancement of Pharmacology—Dr. John Jacob Abel.—EMERSON C. BEELER.

Life's Beginnings on the Earth, by R. BEUTNER, M.D., Ph.D., Professor of Pharmacology, Hahnemann Medical College and Hospital, Philadelphia, Pa. Publishers, The Wilkins Company, Baltimore, Md. Price, $3.00.

Dr. Beutner discusses Vital Growth and Crystallization, Life as Carbon's Outstanding Property, The Importance of Salt and Water for Life and Growth and The Fundamentals of Motion. The author states that a new conception is presented in which Chemistry is used as a key and the latest results in virus research are taken into account.

Textbook of Physiology, by WILLIAM D. ZOETHOUT, Ph.D., Professor of Physiology in the Chicago College of Dental Surgery (Loyola University). Publishers, The C. U. Mosby Company. The Preface to the Sixth Edition is prompted by the publishers and author, 3525 Pine Blvd., St. Louis, Mo., because of the many recent discoveries. The chapters dealing with hormones and vitamins have been carefully rewritten and the chapters on circulation have been largely revised, and much new material has been added. There are 291 illustrations, and about 700 reading and text pages. Price, $4.00.

Some of the Universities using the Zoethout's text are named; Cornell, Illinois, Ohio, Florida, Purdue, Utah, Colgate, Missouri, Washington, Iowa, San Diego, California, Connecticut, Nebraska and others. Women's Colleges: Bryn Mawr, Teachers Colleges, Memphis, Tenn., Greely, Colo., Tampa, Arizona and others. Dental Schools: Atlanta Southern, North Pacific, Tufts, Creighton. Pharmacy Schools: Pittsburgh, St. Louis, Nebraska, Columbia, Maryland, etc. There has been considerable revision and a glossary of the more commonly used terms and a list of prefixes and suffixes have been added.

Biology for Pharmaceutical Students and Others. By S. MANGHAM, M.A. (Cantab.) Professor of Botany, University College, Southampton, formerly Examiner in General Science, Botany and Biology, School Certificate Examinations, Cambridge; in Biology Higher School Certificate, London. Author of an "Introduction to Botany," and joint author of a "First Biology" and a "Second Biology" and A. R. Hockley, B.Sc. (London), lecturer in Zoology, University College, Southampton. Publishers, William Wood & Co., Baltimore, Md. 1938. Price, $6.50. This book is designed primarily to meet the requirements in Biology.

THE ATLANTA MEETING.

The host city for the 87th annual convention of the ASSOCIATION, to be held August 20th–26th, is the commercial, industrial and financial dynamo of the Southeast. Its superb transportation facilities supplied by fifteen main lines of eight railroad systems radiating in all directions, by a complete network of paved highways terminating here, and by six major air lines operating in and out of the city as a base, make it one of the nation's pivotal points. Consult your transportation advisers promptly.

Communication facilities are commensurate with Atlanta's position as headquarters of the Southwest. As the third largest telegraph center in the world, as the largest long distance telephone center in the South and with the rank of third city in air mail volume, Atlanta is well equipped to serve its visitors.

It is a city famed for its beautiful homes, splendid retail stores, impressive office buildings, magnificent churches and many educational institutions of national reputation. Its hotels, social and golf clubs are equally well known.

Atlanta abounds in points of interest of which the principal ones are Stone Mountain; the home of Uncle Remus; various relics from the War Between the States; sites where some of the leading engagements of that war took place; the Cyclorama painting of the Battle of Atlanta; and the High Museum of Art.

A number of beautiful homes and educational institutions, the State Capitol, the Municipal Airport and the Federal Penitentiary are places well worth a visit. The State House encloses a Museum of Georgia products.

Atlanta is situated 1,050 feet above sea level, having the highest altitude of any city its size or larger in the United States, Denver excepted, giving it an ideal, equable climate.

Its strategic location, its active type of people, the great agricultural and industrial wealth of the Southeastern territory which the city serves, caused the United States Department of Commerce in its Commercial Survey of the Southeast, to say: "Atlanta is generally recognized as the principal headquarters city of the Southeastern region."

Set aside the week of August 20th NOW and journey to Atlanta.

PAPERS FOR THE ATLANTA MEETING.

The officers of the Sections of the ASSOCIATION will soon request papers for the meeting. It is hoped that the response will be general and that the papers scheduled will be prepared promptly.

In order that the entire membership of the ASSOCIATION may have the Program of the meeting well in advance, it is planned to print the Program, including the titles of papers, in the July issue of the JOURNAL. In order to do so it will be necessary that titles and abstracts of all papers shall be in the hands of the Editor of the JOURNAL early in July. The requirements are that each paper shall be submitted in duplicate and that the abstract shall not exceed 250 words. The abstracts are mimeographed and furnished to the various pharmaceutical publications and others.

F. O. TAYLOR.